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MODEL 4530
DUAL VOLTAGE-CONTROLLED OSCILLATOR

(Revision C)

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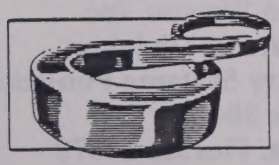
DUAL VOLTAGE-CONTROLLED
OSCILLATOR

(Revision C)

INSTRUCTION MANUAL

December 1985



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* The asterisk indicates pages that changed in the current revision.

July, 1970

MANUAL CHANGE NOTICE #1

EFFECTIVITY: Model 4530, serial numbers 81 and up.

DESCRIPTION: Capacitors C1 and C2 shown in drawings 15800, 16131, and 16130 (pages 5-22, 5-23, and 5-24) are changed. Component values and types are listed on the Calibrate Card parts lists in Section 6.

July, 1970

MANUAL CHANGE NOTICE #2

EFFECTIVITY: Model 4530, serial numbers 88 and up.

DESCRIPTION: Resistors R10 and R96 shown in drawing 15794 on page 5-26 are changed to test variables. See parts list, Section 6, for value range and type.

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SECTION 1

GENERAL DESCRIPTION

1.1 INTRODUCTION

This manual contains information describing the EMR 4530 Dual Voltage-Controlled Oscillator. Included in this information are functional and physical descriptions, system application, specifications, installation and operation instructions, theory of operation, maintenance data, and replaceable and spare parts list. Several configurations of the 4530 are available for particular applications. The various configurations are outlined in the model number identification in Table 2-1.

1.2 FUNCTIONAL DESCRIPTION

The 4530 is a precision solid-state unit designed for use as a subcarrier link between data source devices and data reduction or recording instruments. Included in the 4530 are two voltage-controlled oscillators (VCO's) which are completely independent in operation. Each VCO operates at a particular subcarrier channel center frequency and deviation. These parameters are established by plug-in VCO card assemblies. Center frequency and deviation parameters of each VCO are identified on the front panel.

The 4530 is available for use in constant bandwidth or proportional bandwidth FM telemetry systems. Built-in calibration facilities, under local or remote control, are available in the 4530. These facilities are described in Table 2-1 and in Section 3 of this manual.

Regulated power for operation of the 4530 is provided by an internal power supply and regulator. The power supply and regulator is available for operation from various primary power sources. These are identified in Table 2-1. Also, the 4530 may be supplied without a power supply and regulator. In this configuration, the regulated power is supplied by an EMR 4023 Power Supply which is designed to provide operating power to several of EMR's 4000-Series modular units mounted in close proximity.

A simplified block diagram of the 4530 is shown in Figure 1-1. The VCO's in the 4530 operate from single-ended data sources to provide frequency modulated subcarrier outputs. Separate inputs and outputs are provided for each VCO. Data inputs are routed from the rear connector to the calibrate card. Circuits on this card vary depending on the particular 4530. Certain units contain calibration relays which interrupt the data inputs and provide calibration voltages to the VCO's. Internal or remote calibration commands control the calibrate relays. Calibration voltages are derived from internal or external voltage sources again depending on the particular unit.

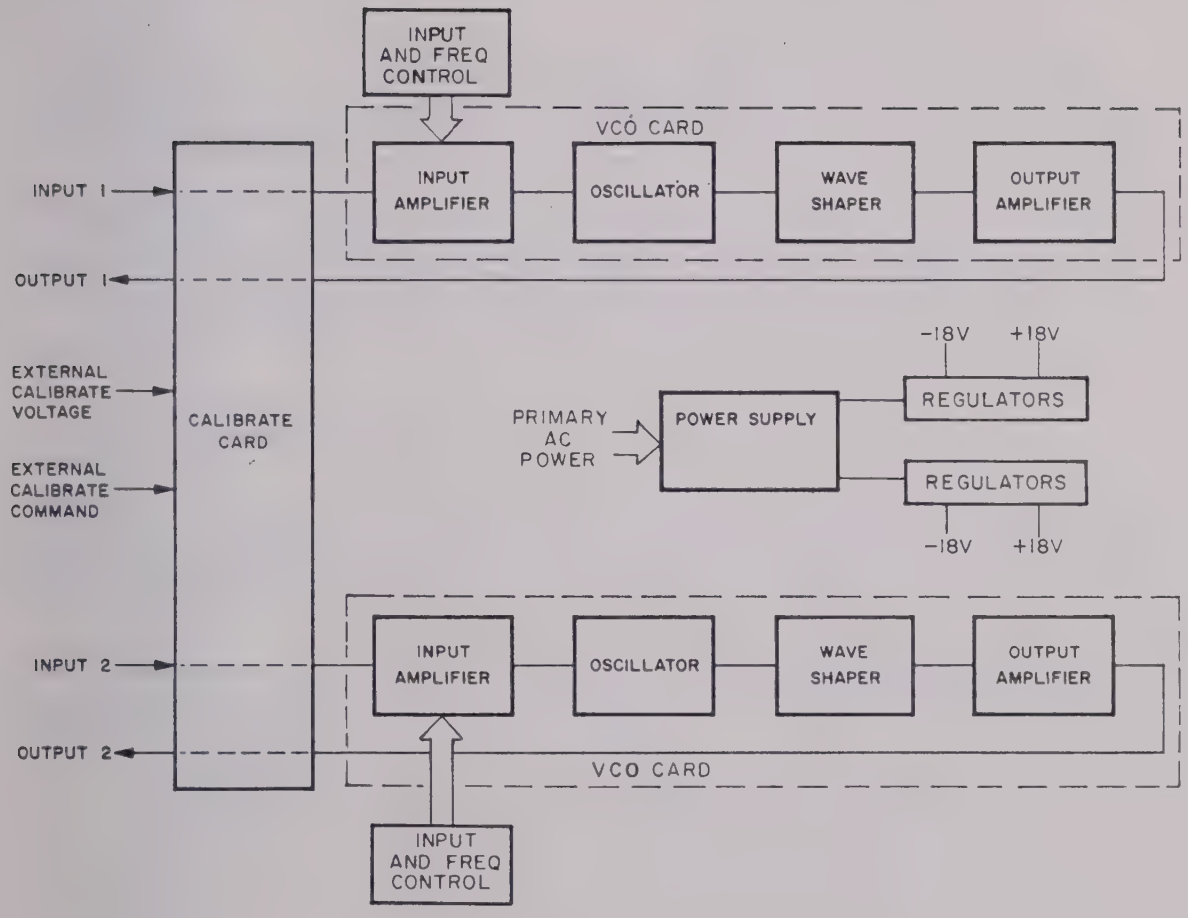


Figure 1-1. EMR 4530 Simplified Block Diagram

Quiescent conditions for the VCO's are established in the input amplifier circuit on the VCO card. Data signals up to 10-volts peak-to-peak are accommodated and any data signal up to this limit can be used to deviate the VCO from bandedge-to-bandedge. The input level adjustment in the input amplifiers is performed at the INPUT controls. The input amplifiers may be offset such that the signal outputs to the oscillators are at levels necessary to offset the oscillator frequencies to a bandedge of the selected subcarrier channel. This adjustment is performed at the FREQ controls.

The oscillators are triangular wave generators which operate at the nominal frequency of the selected subcarrier channel. Subcarrier frequencies within the subcarrier channel are controlled by an input voltage from the input amplifier.

Waveshaper circuits provide cornering to convert the triangular wave signals to sine wave subcarrier signals. The waveshaper outputs are coupled through OUTPUT level controls and output amplifier circuits to the 4530 outputs. The OUTPUT level controls provide continuous adjustment of the subcarrier outputs from 0.2 volt RMS to not less than 2 volts RMS (open circuit).

1.3 PHYSICAL DESCRIPTION

The 4530 is a modular unit designed for mounting in an EMR 4005 Rack Adapter. One modular width of the rack adapter is required for mounting the 4530. (Refer to the EMR 4005 Rack Adapter Instruction Manual for information describing the rack adapter.)

The 4530 consists of five major subassemblies. These subassemblies are shown on the top assembly drawing 14991 in Section 5 of this manual. The five major subassemblies are listed as follows:

Chassis Assembly	--	Item 1 on drawing 14991; shown independently in drawing 14992 of Section 5.
Front Panel Assembly	--	Item 2 on drawing 14991; shown independently in drawing 14990 of Section 5.
Regulator Card Assembly	--	Item 6 on drawing 14991; shown independently in drawing 15799 of Section 5.

Calibrate Card Assembly	--	Item 7 on drawing 14991; shown independently in drawing 15906 of Section 5.
VCO Card Assemblies	--	Item 8 on drawing 14991; shown independently in drawing 15796 of Section 5.

Although several configurations of the 4530 are available, all units are generally the same in physical layout. All units except the 4530-9X series contain a complete complement of subassemblies as listed above. The 4530-9X series does not have an internal power supply; therefore, the power supply components and regulator card are not included. The remaining 4530 configurations differ only in the type of calibration facilities included. The various calibration facilities are provided by including wiring in the unit and adding components to the calibration card.

1.4 SYSTEM APPLICATION

A typical system in which the 4530 may be used is shown in Figure 1-2. This diagram also illustrates other EMR equipments available which may be used in conjunction with the 4530.

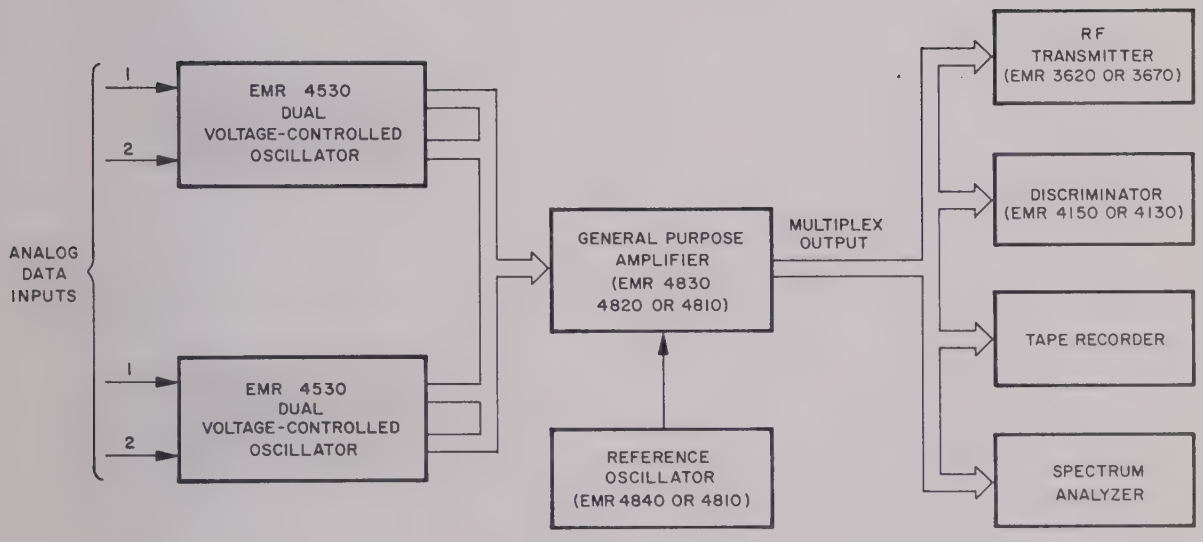


Figure 1-2. Typical System Application

SECTION 2

SPECIFICATIONS

2.1 GENERAL

This section contains the electrical, mechanical, and environmental specifications for the EMR 4530. Also included is a model number identification table (Table 2-1) which contains the complete model number of the unit and a description of each digit in the model number.

2.2 ELECTRICAL SPECIFICATIONS

2.2.1 Input Characteristics

a. Input Impedance: Not less than 100K ohms shunted by not more than 100 Pf.

b. Input Signal Amplitude Range: 1.0 to 10.0 volts peak-to-peak for full bandwidth deviation. Adjustable with front panel control.

c. Deviation Polarity: Positive.

d. Deviation Limiting: With input levels of up to 500% of full-scale input, frequency deviation is limited to not more than 15% of full bandwidth beyond bandedge.

e. DC Offset: Continuously variable from high-to-low bandedge.

2.2.2 Output Characteristics

a. Center Frequency: Proportional or constant bandwidth channels with center frequencies of 300 Hz through 1.5 MHz.

b. Deviations: ±2% through ±40%.

c. Center Frequency Stability: Center frequency drift is not more than ±0.05% of center frequency for 15 hours at a constant temperature (±3°C) after a 15-minute warm-up. Zero-input frequency will drift no more than ±0.01% per °C average over the ambient temperature range of +10°C to +50°C.

d. Bandwidth Stability: Bandwidth drift is not more than ±0.20% of full-scale deviation for 15 hours at a constant temperature (±3°C) after a 15-minute warm-up. With an ambient temperature of +10°C to +50°C, bandwidth drift is no more than ±0.025% per °C average.

e. Static Linearity: Best straight line non-linearity is not more than ±0.1% of bandwidth.

f. Intelligence Response: For frequencies corresponding to a modulation index of 2 or more, the change in intelligence response is not more than ±0.5 Db from DC up to 100 KHz. At 500 KHz, the intelligence response is down by not more than 3 Db from that measured at DC.

g. Intelligence Distortion: In a system with a deviation ratio of 5, the intelligence distortion is not more than 0.5% at any frequency up to cutoff.

h. Overload Recovery: For a 500% overload of any duration and at any sensitivity, the output frequency returns to within ±0.1% of final value in not more than 5 microseconds or one carrier cycle period, whichever is greater.

i. Amplitude Modulation: Amplitude modulation of the sine wave output for any deviation is not more than 0.5 Db.

j. Subcarrier Distortion: At any deviation, the harmonic distortion of the subcarrier output is not more than 1% for individual harmonics not more than 1.5 MHz.

k. Sine Wave Output: Continuously adjustable at the front panel from 0.2 volt RMS to not less than 2 volts RMS open circuit.

l. Line Voltage Sensitivity: A 10-volt change in line voltage within the operating range of 105 to 132 volts causes a change in center frequency of not more than ±0.02%, and a change in bandwidth of not more than ±0.1%.

m. Output Noise: FM noise output is not more than 0.1% of full bandwidth RMS as measured in a deviation-ratio-of-5 system.

n. Output Impedance: Standard output impedance is 220 ohms ±10% for direct resistive mixing. An internal jumper may be added to change the impedance to 50 ohms ±10%.

2.2.3 Power Requirement

The input power requirements are listed in Table 2-1. The unit is fused from the AC power input with a 1 amp fuse for 120-volt operation and with a 500 milliamp fuse for 220-volt operation.

2.2.4 Calibration Provision

The various calibration provisions are described in Table 2-1. Internal calibration voltages are within ±0.2% of full-scale voltages specified in Table 2-1.

2.3 MECHANICAL SPECIFICATIONS

a. Height: 5-1/4 inches (13.3 Cm).

b. Width: 1.22 inches (3.10 Cm).

c. Depth: 16.75 inches, excluding front panel projections.

d. Weight: Net, 3-1/8 pounds (1.42 Kg); shipping, 5 pounds (2.27 Kg).

e. Panel Finish: Several paint colors are available as listed in Table 2-1.

f. Mounting: The unit is designed for mounting in an EMR 4005 Rack Adapter. The rack adapter occupies 5-1/4 inches by 19 inches (13.3 Cm by 48.2 Cm) in a standard equipment rack.

2.4 ENVIRONMENTAL SPECIFICATIONS

a. Temperature: Operating, +10°C to +50°C; storage, −55°C to +85°C.

b. Altitude: 0 to 50,000 feet.

c. Relative Humidity: 5% to 95%.

d. Vibration: Non-operating, per MIL-STD-810A, method 514, equipment class 6, Figure 514-6, curve A.

e. Shock: Non-operating, per MIL-STD-810A, method 516, procedure III.

Table 2-1. EMR 4530 Model Number Identification

4530 - a: XX - b: XXXX.XXX - c: XXX.XX - d: XXXX.XXX - e: XXX.XX - f: XX.XX - g: XX.XX - h: XX	
a.	First Digit: Input power identification. 0 -- 105 to 132 volts RMS, 47 to 65 Hz. 7 -- 105 to 132 volts RMS, 360 to 440 Hz. 8 -- 230 volts RMS ±10%, 47 to 63 Hz. 9 -- No power supply included, requires ±18 volts supplied by external supply, such as an EMR 4023 Power Supply. Second Digit: Oscillator Configuration. 1 -- No calibration. 2 -- External calibration source, remote control. 3 -- Internal calibration source, remote control. 4 -- Internal calibration source, local control.
b.	VCO 1 center frequency in 7-digit KHz.
c.	VCO 1 peak deviation in 5-digit % for PBW subcarrier channels or 5-digit KHz for CBW subcarrier channels.
d.	VCO 2 center frequency in 7-digit KHz.
e.	VCO 2 peak deviation (same as VCO 1).
f.	Negative Calibrate Voltage: For 4530-X3 and X4, negative calibrate voltage in 4-digit volts.
g.	Positive Calibrate Voltage: For 4530-X3 and X4, positive calibrate voltage in 4-digit volts.
h.	Panel Paint Code: 01 -- Light green 00048W 02 -- Dark green 00049W 04 -- Gray 26492B 99 -- Special

SECTION 3

INSTALLATION AND OPERATION

3.1 INSTALLATION

The EMR Model 4530 Dual Voltage-Controlled Oscillator is shipped completely assembled and is ready for mounting. The unit should be inspected immediately on its arrival and notice given to EMR-Telemetry of any claim that the product does not conform with the terms of the order.

The Model 4530 is a modular unit designed for mounting in an EMR Model 4005 Rack Adapter. The modular unit is positioned on T-rails on the bottom surface of the rack adapter interior and is inserted into the mounting location. A push-to-lock knob on the front panel is depressed securing the unit in the mounting location of the rack adapter. The unit rear connector J1 mates with a receptacle in the rack adapter interior completing the electrical connections.

Information illustrating the position of the unit in the rack adapter and internal wiring of the rack adapter is contained in the EMR Model 4005 Rack Adapter Instruction Manual. The Model 4530 rear connector J1 and the external connections terminated at J1 are illustrated in Figure 3-1.

Internal cooling for the Model 4530 is provided by a blower mounted vertically on the rack adapter rear panel.

3.2 OPERATION

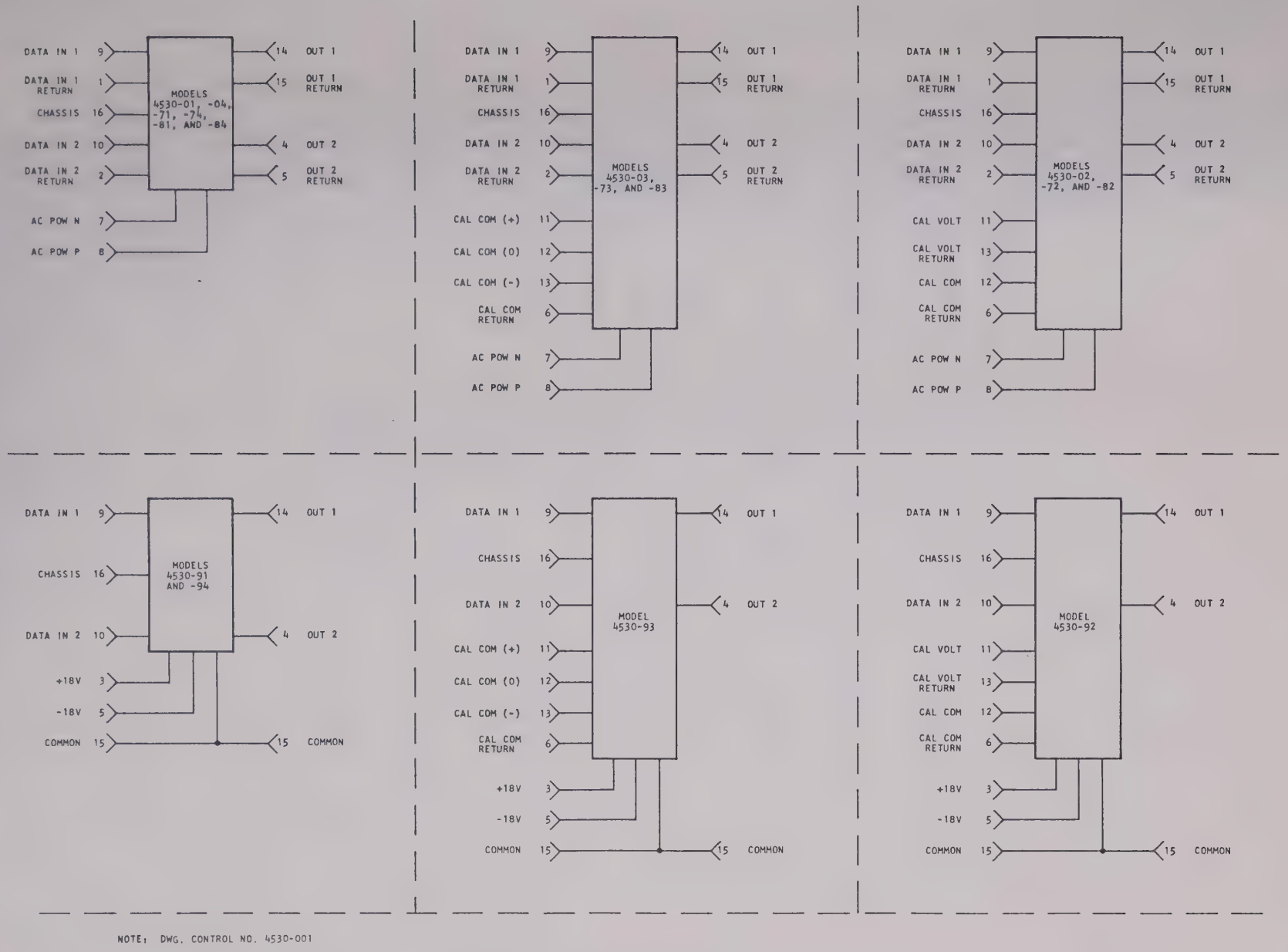
3.2.1 Operating Controls and Monitor Jacks

The operating controls and monitor jacks used for operation of the Model 4530 are illustrated in Figure 3-2 and described in Table 3-1.

3.2.2 Signal Input Configurations

The 4530 VCO's operate independently from single-ended data sources. For certain 4530 design sequences, two separate inputs (input and input return) to each VCO are provided. The remaining 4530 design sequences contain only one input and a unit common input. However, for both types of units, the data signal input must be applied to the input terminal. The input return and unit common connections are signal ground inputs.

The deviation sense of the VCO's is positive in that a positive voltage applied at the input will yield a frequency increase at the output. A negative voltage applied at the input will yield a frequency decrease at the output.



NOTE: DWG. CONTROL NO. 4530-001

Figure 3-1. EMR 4530 External Electrical Connections

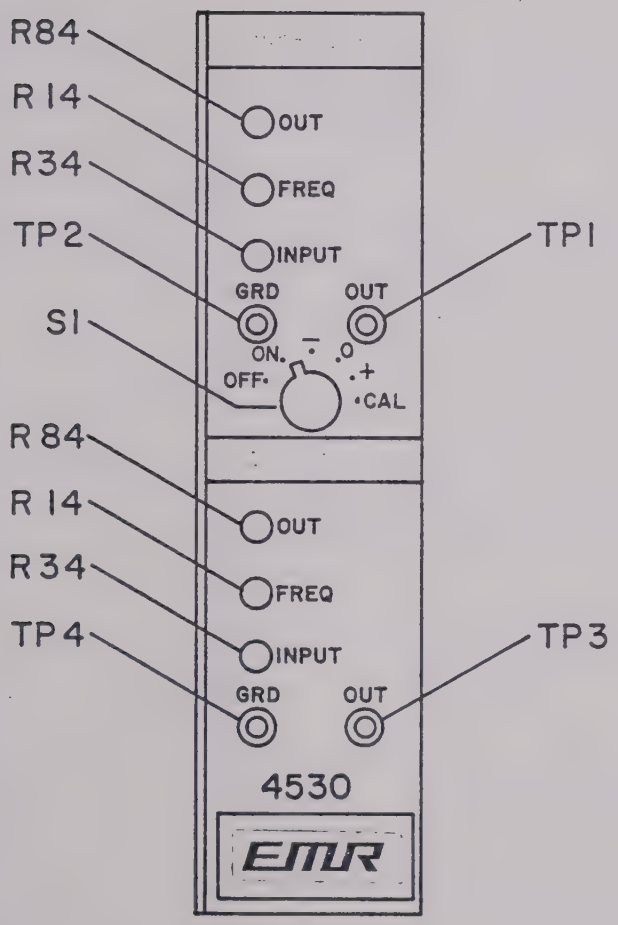


Figure 3-2. EMR 4530 Front Panel Components

Table 3-1. EMR 4530 Function of Front Panel Components
(Ref. Figure 3-2)

DESIG.	NAME	FUNCTION
R84	OUT control	Adjusts the amplitude of the VCO output. The top R84 is for VCO #1 and the bottom R84 is for VCO #2.
R14	FREQ control	Adjusts the VCO frequency. This control permits continuous adjustment of the VCO frequency from LBE to HBE. The top R14 is for VCO #1 and the bottom R14 is for VCO #2.
R34	INPUT control	Adjusts the full-bandwidth deviation voltage input of the VCO up to 10-volts peak-to-peak. The top R34 is for VCO #1 and the bottom R34 is for VCO #2.
TP2	GRD test jack	Output return for VCO #1.
S1	Control switch	Provides OFF/ON control for all 4530's and provides local calibrate selection for the 4530-X4. Calibrate positions are as follows: CAL (–) -- Both VCO's in calibrate mode and negative calibrate voltage input. CAL (0) -- Same as CAL (–) except zero calibrate voltage input. CAL (+) -- Same as CAL (–) except positive calibrate voltage input.
TP4	GRD test jack	Output return for VCO #2.
TP3	OUT test jack	VCO #2 output test jack.
TP1	OUT test jack	VCO #1 output test jack.

3.2.3 Operating Information

In the data mode of operation, the two VCO's in the 4530 operate independently from two separate sources. Separate inputs, outputs, and front panel operating controls are provided for each VCO. In a calibrate mode of operation, the VCO inputs are both switched to operate from a single calibrate input source. The mode of operation is selected either at the front panel or remotely depending upon the particular 4530 design sequence. Various calibration facilities are described in paragraph 3.2.4.

The initial set up of the VCO's is dependent upon the particular application. The following general steps are provided to assist the operator in the set up of the 4530.

a. Positive Data Sources: When the data sources on which the VCO's are to operate are positive, the quiescent VCO frequencies should be offset to a frequency corresponding to low bandedge (LBE). This offset adjustment is performed with the front panel FREQ controls. The positive-going data signal thus drives the VCO frequency to high bandedge (HBE). The expected peak amplitude of the data signal should be determined and the VCO input level set such that this peak data signal will deviate the VCO to full bandwidth. The VCO input level is adjusted with the front panel INPUT controls.

b. Negative Data Sources: Set up is the same as step (a) above except that the quiescent VCO frequencies should be offset to HBE. Thus, the negative data signals drive the VCO frequencies to LBE.

c. Bipolar Data Sources: For bipolar data signal sources, the VCO's are set to operate at center frequency and the bipolar data signals deviate the VCO frequencies to HBE and LBE. The quiescent VCO frequencies are again set using the front panel FREQ controls. The expected peak-to-peak amplitude of the data signal sources are used in determining the INPUT level adjustment.

3.2.4 Calibration Facilities

The 4530 is available in four calibration configurations. These configurations are described as follows:

a. 4530-X1 -- No built in calibration. Initial set up and calibration is performed via the data inputs to the unit by external equipments.

b. 4530-X2 -- Calibration relays are included which are controlled by a remote calibration command to switch the data inputs to the VCO's to a single calibration voltage input. Calibration voltage input must be supplied by an external source. The required calibration voltage is dependent upon the quiescent settings of the VCO's. The remote calibration command voltage required is +24 volts ±6V DC.

c. 4530-X3 -- Calibration relays are included which are controlled by a remote calibration command to switch the data inputs to the VCO's to a single calibration voltage input. The calibration voltage is derived from a built-in voltage divider. This voltage divider provides specified voltages for (−), (0), and (+) calibration selection. The calibration voltages are established by the customer in the ordering information (See Table 2-1). The remote calibration command voltage required is +24 volts ±6 V DC.

d. 4530-X4 -- Same as the 4530-X3 except that the calibrate mode and calibrate selection are performed at the front panel control switch. The calibration voltages are established by the customer in the ordering information (See Table 2-1).

SECTION 4

THEORY OF OPERATION

4.1 GENERAL

This section contains the detailed theory of operation for the EMR 4530. The theory discussion is presented at the card level with reference to schematic diagrams in Section 5 and, where appropriate, to detailed block diagrams in this section. A general description and simplified block diagram of the 4530 are contained in Section 1 of this manual. The user should be thoroughly familiar with the general information in Section 1 before proceeding to this theory discussion.

4.2 CALIBRATE CARD

Four calibrate card configurations are used in the 4530. The particular configuration used is dependent on the design sequence. These four configurations are described in the following paragraphs.

4.2.1 EMR 4530-X1-Series Calibrate Card

The calibrate card used in these units is shown schematically in EMR drawing 15800 in Section 5 of this manual. This card does not contain any calibration components and is used only as a jumper card. Data inputs and input commons for both VCO's and the subcarrier outputs from the VCO's are routed through this card. Output transformers are included on all cards (except the 4530-91) which provide floating subcarrier outputs. Subcarrier outputs for the 4530-91 are direct coupled and are thus single-ended.

4.2.2 EMR 4530-X2-Series Calibrate Card

The calibrate card used in these units is shown schematically in EMR drawing 16131 in Section 5 of this manual. This card contains calibration relays which interrupt the separate data inputs to the VCO's and instead connects a calibration voltage input to both VCO's. Both the data input and input return are switched to an external calibrate input and calibrate input return. The calibration voltage is supplied from external devices. Switching is performed by calibrate commands also derived from external equipments.

Subcarrier outputs from the VCO's are routed through this card to the 4530 outputs. Transformer coupling at the outputs (for all but the 4530-92) provides floating subcarrier outputs. For the 4530-92, the output transformers are not included and the jumpers are installed instead providing single-ended outputs.

4.2.3 EMR 4530-X3- and -X4-Series Calibrate Card

The calibrate card used in these units is shown schematically in EMR drawing 16130 in Section 5 of this manual. This card contains a built-in calibration network and switching relays which interrupt the separate data inputs to the VCO's and instead connects the calibration voltages to the VCO's. The calibration network consists of two voltage dividers operating from the + and −18 volt regulated DC source. These networks are connected to the plus and minus calibration relays. Calibration commands (+, −, and 0) are derived either from the front panel CAL switch or from an external source, depending on the particular 4530. For the 4530-X3, calibration commands are derived from an external source. Calibration commands for the 4530-X4 are selected at the front panel CAL switch. Subcarrier outputs from both VCO's are also routed through this card.

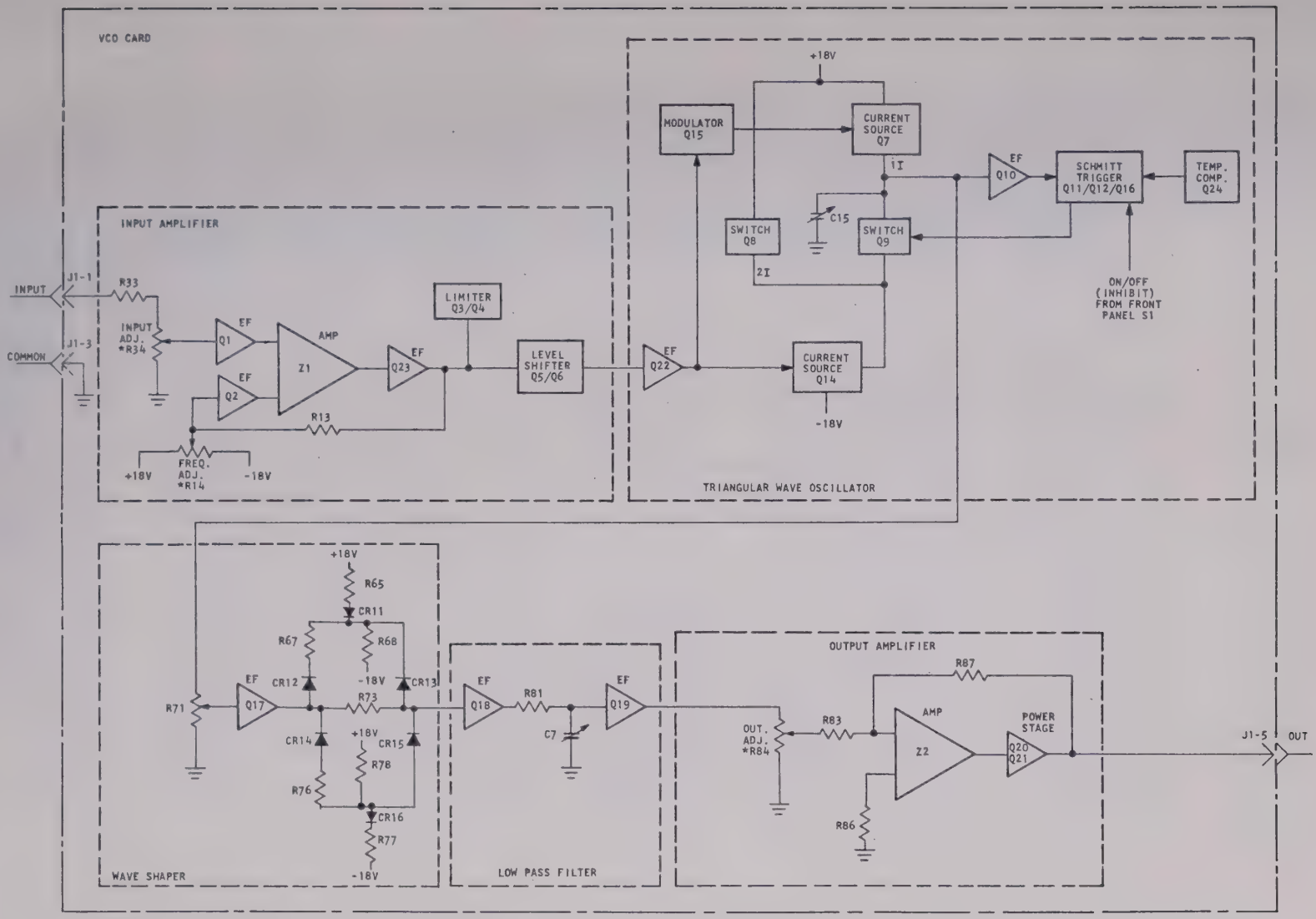
Transformer coupling is used for the 4530-X3 and -X4 VCO outputs (except the 4530-93 and -94 versions) which provides floating subcarrier outputs. For the 4530-93 and -94 versions, jumpers are installed instead of the transformers and the subcarrier outputs are thus single-ended.

4.3 VOLTAGE-CONTROLLED OSCILLATOR (VCO) CARD

The 4530 contains two identical subcarrier oscillators, each located on a VCO card. Therefore, the circuit description in this paragraph is used for either of the VCO cards. An overall block diagram of the VCO card is shown in Figure 4-1. The schematic diagram for the VCO card is shown in EMR drawing 15794 in Section 5 of this manual.

The VCO input is routed through card terminal J1 pin 1 to the INPUT control R34. This resistor adjusts the gain of amplifier (Z1) such that any input signal from 1 volt peak-to-peak to 10 volts peak-to-peak may be used to provide an output to the oscillator corresponding to full-bandwidth deviation. A second input to Z1 is an offset level established by FREQ control R14. This control provides continuous offset adjustment of the amplifier to either bandedge equivalent. A limiter circuit, Q3 and Q4, establishes the maximum voltage swing at the amplifier output. Positive and negative stages in the limiter are triggered when the voltage level increases or decreases to the reference level established in the limiter. This limiting action prevents the oscillator from being over deviated. A level shifting stage, Q5 and Q6, changes the modulating voltage levels to the level necessary for proper operation of the oscillator.

The oscillator is a triangular wave generator which is set to operate at a nominal frequency of the selected subcarrier channel. Operating frequencies within the subcarrier channel are controlled by an input voltage from the input amplifier circuits. In the quiescent state (no input from the input amplifier circuits), the operation of the oscillator is as follows:



NOTES:

1. *--ADJUSTMENTS AS VIEWED FROM FRONT PANEL.
2. DWG. CONTROL NO. 4530-002.

Figure 4-1. VCO Card Detailed Block Diagram

a. Transistor switch Q8 is closed and Q9 is open. Two units of constant current are drawn by current source Q14 through switch Q8. Simultaneously, one unit of constant charging current charges C15 from current source Q7.

b. Constant charging current in C15 produces a linear ramp voltage at the output which is coupled through emitter-follower Q10 to Schmitt trigger Q11, Q12, and Q16. When this voltage increases to a specified level, the Schmitt trigger turns on and supplies an output which closes switch Q9.

c. When Q9 is closed, switch Q8 is automatically opened due to the coupling between Q8 and Q9. The two units of current through Q14 must, in this condition, flow through switch Q9. Since current source Q7 provides only one unit of current, the second unit of current flows from capacitor C15 which is the discharge current for C15. Since the discharge current is also constant, the ramp voltage at C15 decreases linearly.

d. The linear decrease in ramp voltage at C15 is monitored by the Schmitt trigger. When this voltage decreases to a specified level, the Schmitt trigger turns off and opens switch Q9. Switch Q8 is again closed and one oscillator cycle is complete. This process repeats for each cycle of the oscillator.

e. The frequency of the oscillator is established by timing capacitor C15. Increasing or decreasing the value of this capacitor, in turn, increases or decreases the time required to charge and discharge, thus determining the slope of the ramp voltage. The peak-to-peak amplitude of the triangular wave is held constant by the switching level of the Schmitt trigger, therefore, a change in slope represents a change in frequency.

f. The levels at which the Schmitt trigger are operated are determined primarily by zener diode CR7 and the amount of current drawn by current source Q16.

g. A temperature compensation network, Q24, operates in conjunction with the Schmitt trigger. This network increases or decreases the biasing in the Schmitt trigger to compensate for enviromental temperature changes.

The oscillator modulation is performed by modulating the current through the current sources. Both current sources are modulated so that the positive-going portion of the ramp voltage is changed when C15 is charged, and the negative-going portion is changed an equal amount when C15 is discharged. This maintains a symetrical triangular wave output which changes only in frequency.

The wave shaper circuits are diode cornering networks which convert the triangular wave subcarrier input to a sine wave signal. This network includes two positive stages and two negative stages which operate on the positive and negative portions, respectively, of the triangular wave subcarrier input. Each stage in the networks is set to turn on when the signal increases to a specified level. This level is the break point of the stage. The break points of the two stages in the networks are staggered such that the first stage turns on at a lower level than the second stage. Thus, when the signal level increases (either positive or negative), the first stage turns on providing a certain rounding effect. As the signal further increases, the second stage turns on and additional rounding is provided. When the signal reverses direction, the stages are thus turned off in reverse order. The turning on of the stages exhibits a load on the signal input which performs the rounding effect. The loading characteristics of the diode and resistor stages are non-linear because of the non-linearity required to produce a sine function.

The output of the wave shaper is essentially a sine wave subcarrier signal; however, a certain peak remains in the waveform due to the instantaneous polarity change at the peak of the triangular wave. To eliminate the remaining distortion in the sine wave subcarrier, the signal is passed through a single-pole low-pass filter network. The resultant signal is developed across OUT potentiometer R84. The signal level selected at this potentiometer is amplified by an amplifier and power stage and routed to the VCO card output terminal J1-5.

4.4 POWER SUPPLY COMPONENTS AND REGULATOR CARD

The power supply components and regulator card are included in all 4530's except the 4530-9X series. Regulated DC power for operation of the 4530-9X series is provided from an external power supply. An overall block diagram of the power supply components and regulator card circuits is shown in Figure 4-2. The power supply components are illustrated in detail in the system schematic, EMR drawing 16135, in Section 5 of this manual. The schematic diagram for the regulator card is shown in EMR drawing 15796 also in Section 5.

The primary AC power input is routed through the rear connector J1 and fuse, F1, to the primary winding of T1. Two secondary windings are connected to two full-wave diode rectifiers. These rectifiers supply the unregulated DC voltages for operation of four regulator circuits on the regulator card. Each rectifier supplies power to a +18-volt and a -18-volt regulator.

Since the four regulators are of the same basic configuration, only one +18-volt regulator is shown in the block diagram, Figure 4-2. Each VCO is powered by a separate set of + and −18-volt regulators which are floating with respect to each other. This makes possible independent VCO operation with floating inputs.

The regulators are conventional series regulator circuits. Regulation is performed by comparing a sample of the output potential with a voltage reference developed by zener diode CR3. A differential amplifer, Q3 and Q4, detects any voltage difference and routes a correction voltage back to the series control transistor Q1. This component increases or decreases the biasing of series regulator transistor, Q1, (mounted on the chassis) which compensates for voltage variations at the output.

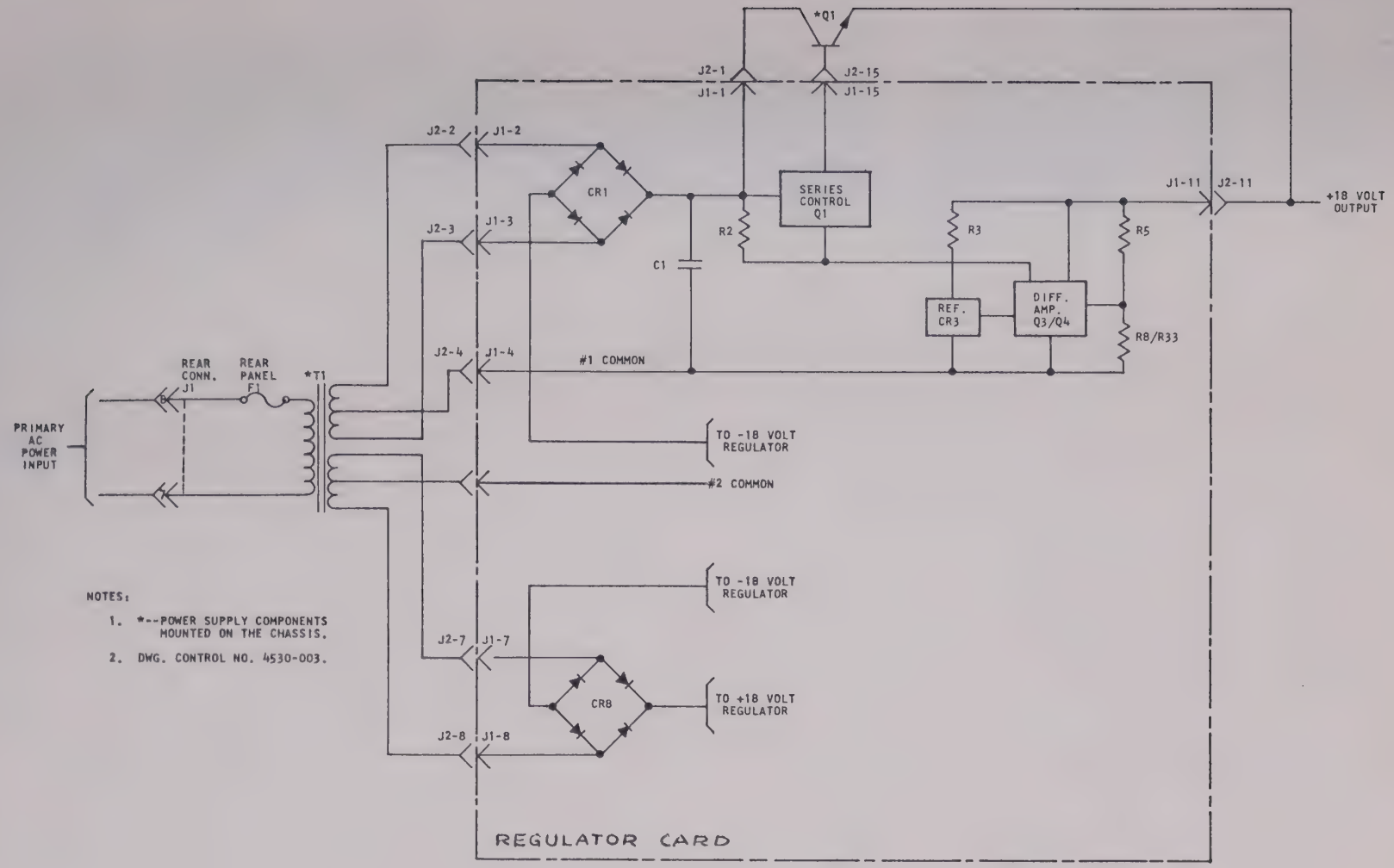


Figure 4-2. Power Supply and Regulator Detailed Block Diagram

SECTION 5

MAINTENANCE

5.1 GENERAL

This section contains information to aid in maintaining the EMR 4530. The maintenance information includes a Maintenance Guide (paragraph 5.2), Adjustment Procedures (paragraph 5.3), and Drawings (paragraph 5.4). Prior to attempting any maintenance of the 4530, the operator should be thoroughly familiar with the operating procedures and theory of operation as contained in Sections 3 and 4 of this manual.

5.2 MAINTENANCE GUIDE

This paragraph outlines the method for troubleshooting and repair of the 4530. In the event an abnormal condition is detected in the unit operation, the following general method of isolating and repairing the trouble is recommended.

a. Perform an inspection (paragraph 5.2.1).

b. Perform troubleshooting procedures (paragraph 5.2.2).

c. When defective component is located, refer to Section 6, Parts List, for replacement component information.

d. Recheck affected circuit to ascertain that the malfunction is repaired.

e. Perform adjustments in affected circuit when necessary (paragraph 5.3).

5.2.1 Inspection

The Model 4530 should be subjected to a regular inspection program similar to that recommended for other types of electronic equipment. The inspection program should be performed periodically as a means of preventive maintenance, or if a malfunction occurs, to aid in isolating the trouble. The inspection guide is as follows:

a. Inspect front and rear panel components for signs of damage.

b. Inspect wiring for loose or broken connection.

c. Inspect printed-circuit cards for mechanical damage or component discoloration.

d. Inspect printed-circuit card connectors for signs of damage.

5.2.2 Troubleshooting

An electrical malfunction in the 4530 will normally be located on one of the printed-circuit cards in the unit. The following general steps are provided to check the operation of the cards and to isolate a malfunction.

a. Refer to the system schematic diagram, EMR drawing 16135, and check the regulated DC voltage outputs. These voltages should be ±18 volts ±0.1 volt. If the voltages are within tolerance, refer to step (b) of this procedure. If voltages are not within tolerance, refer to the theory description in paragraph 4.4 and to the regulator card transistor voltage measurements in Table 5-1, and troubleshoot the power supply/ regulator circuits.

b. The calibrate card configuration varies significantly depending on the particular model of the 4530. However, the card circuits for all configurations are primarily switching networks. Refer to the theory description in paragraph 4.2 and check the switching networks, calibrate inputs (where applicable) or data signal inputs, and subcarrier outputs.

c. The VCO cards contain several functional circuits as shown in the card detailed block diagram, Figure 4-1. To isolate a malfunction on the VCO card, a checkout procedure is provided to check each functional circuit. When in the course of this procedure, a malfunctioning circuit is located, refer to the VCO card schematic diagram (EMR drawing 15794) and VCO card voltage measurement and waveforms table (Table 5-2), and troubleshoot the appropriate circuit. The equipment necessary to perform this procedure is as follows:

1. Signal Generator -- Hewlett Packard 200CD or equivalent.

2. Oscilloscope -- Tektronix 535 or equivalent.

3. Frequency Counter -- Hewlett Packard 5245L or equivalent.

The checkout procedure is as follows:

1. Operate the VCO under test in the data mode with no signal input and no subcarrier output termination.

2. Using the oscilloscope, monitor the junction of resistors R22 and R24 and adjust front panel FREQ control for a 0-volt indication.

3. Using the external signal generator, apply a 500 Hz signal of approximately 10 volts peak-to-peak to the VCO via rear connector signal input terminal.

4. Using the oscilloscope, monitor the junction of resistors R22 and R24 and adjust front panel INPUT control for a 5-volt peak-to-peak indication. This indicates proper operation of the input amplifier.

5. Increase the signal level at the external signal generator and observe that the limiting occurs on both positive and negative peaks at approximately ±3.2 volts. This indicates proper operation of deviation limiting.

6. Remove the signal input from the VCO. The input amplifier check is complete.

7. Using the oscilloscope, monitor the oscillator output at capacitor C15. This output should be a triangular wave subcarrier signal of approximately 4.5 volts peak-to-peak.

8. Connect the frequency counter to the output jack on the oscilloscope. Monitor capacitor C15 and check the oscillator frequency. Frequency should be approximately center frequency of the subcarrier channel.

9. Rotate front panel FREQ control in both directions and monitor the oscillator frequency to ascertain that both bandedge frequencies are obtainable. The oscillator check is complete.

10. Using the oscilloscope, monitor the waveshaper signal at the emitter element of transistor Q18. This signal should be a sine wave subcarrier signal of approximately 0.8 volts peak-to-peak.

11. Using the oscilloscope, monitor the output amplifier input at the input side of resistor R83. This signal amplitude depends on the setting of R84.

12. Using the oscilloscope, monitor the output amplifier output at VCO card OUTPUT terminal J1-5.

13. Rotate front panel OUT control fully clockwise to ascertain that a sine wave subcarrier signal of at least 2 volts RMS is obtainable.

5.3 ADJUSTMENTS

The adjustments in this paragraph may be used for readjustment after unit repair or they may be used to checkout and adjust the 4530 after long periods of operation. The procedure is provided at the card level so that any card may be adjusted independently.

Any adjustments contained in the procedure may be performed without specialized equipment. However, adjustments in the unit not contained in the procedure should not be attempted in the field. Specifically, adjustments in the temperature compensation circuit are critical and require special environmental equipments to perform the adjustment. Should adjustment in this circuit be necessary, return the unit to EMR.

A list of the equipments necessary to perform this procedure is as follows:

a. DC Voltmeter, Fluke 825A or equivalent.

b. Frequency Counter, Hewlett Packard 5245L or equivalent.

c. Distortion Analyzer, Hewlett Packard 331A or equivalent.

d. DC voltage source accurate to ±0.1%.

5.3.1 Calibrate Card Adjustments

Adjustments are provided only on the calibrate card in the 4530-X3- and -X4- series units. These cards contain adjustments for the built-in calibrator circuits. The calibrator adjustments are as follows:

a. Refer to EMR Drawing 16130.

b. Supply calibration command to CAL COMMAND (+), 24 ±6 volts, either from external equipments or front panel CAL switch depending on the particular unit.

c. Using the DC voltmeter, monitor VCO card 1 input (card terminal J1-1).

d. Determine positive calibration voltage from model number on the unit (See Table 2-1).

e. Adjust calibrate card potentiometer R5 for the specified calibration voltage ±0.2%.

f. Using the DC voltmeter, monitor VCO card 2 input (card terminal J1-1).

g. Adjust calibrate card potentiometer R7 for the specified calibration voltage ±0.2%.

h. Supply calibration command to CAL COMMAND (−).

i. Using the DC voltmeter, monitor VCO card 2 input (card terminal J1-1).

j. Determine negative calibration voltage from model number on the unit (See Table 2-1).

k. Adjust calibrate card potentiometer R13 for the specified calibration voltage ±0.2%.

l. Using the DC voltmeter, monitor VCO card 1 input (card terminal J1-1).

m. Adjust calibrate card potentiometer R11 for the specified calibration voltage ±0.2%.

5.3.2 VCO Card Adjustments

Since the two VCO cards are identical, the adjustment procedure as provided in this paragraph may be used for either card. Adjustments on the VCO cards are primarily involved with adjusting the linearity and symetry of the oscillator, and distortion nulling of the waveshaper. Symetry adjustments affect the distortion of the VCO card circuits. Center frequency and deviation parameters for the cards are set at the factory and require no further adjustment. Frequency offset and input level adjustments are performed at the front panel FREQ and INPUT controls. These controls are considered operating components and do not require adjustment procedures. Operating controls are described in Section 3 of this manual.

The VCO card adjustment procedure is provided in four sections, (1) a calibration setup procedure for use in conjunction with the oscillator linearity and symetry adjustments, (2) the oscillator linearity adjustment, (3) the oscillator symetry adjustment, and (4) the waveshaper adjustments. The adjustment procedure is as follows:

a. Oscillator Calibration --

1. Short the VCO input to the input return or unit common at the rear connector.

2. Using the frequency counter, monitor the VCO output at the appropriate front panel test jack.

3. Adjust the front panel FREQ control until the output frequency is equal to the center frequency of the VCO (within ±0. 1%).

4. Remove the input short and apply a positive DC calibration voltage, equal to full scale deviation, at the input. (If the 4530 contains a built-in calibrator, the internal positive calibrate voltage can be used for this input.)

5. Adjust the front panel INPUT control until the output frequency is equal to the upper bandedge of the VCO (within ±0. 1%).

6. Repeat steps 1 through 5 to ascertain that center frequency and upper bandedge frequencies are within ±0. 1% of the specified frequencies.

b. Oscillator Linearity -- This procedure is primarily, applicable for oscillators operating at center frequencies of 50 KHz or above. Some deviation of this rule exists, however. Refer to the VCO card and observe whether a jumper is installed between card terminals E1 and E2. If a jumper is installed, this procedure is not applicable. If a jumper is not installed, proceed as follows:

1. Using the frequency counter, monitor the appropriate front panel test jack.

2. Perform a three-point linearity check (upper bandedge, center frequency, and lower bandedge frequencies) using the positive and negative calibration voltages as established in step (a) of this procedure.

3. If best-straight-line linearity is within 0. 1% of bandwidth, the adjustment is proper. If not, proceed to step 4.

4. Rotate potentiometer R37 1/2 turn at a time and perform three-point linearity checks until the

0.1% of bandwidth is obtained. Rotations of less than 1/2 turn may be necessary when the adjustment is close.

c. Oscillator Symetry --

1. Using the distortion analyzer, monitor the emitter element of transistor Q13 on the VCO card.

2. Offset the oscillator frequency to the lower bandedge using the calibration setup in step (a) of this procedure.

3. Adjust potentiometer R56 for a minimum distortion indication.

4. Offset the oscillator frequency to upper bandedge.

5. Adjust potentiometer R60 for a minimum distortion indication.

6. Repeat this procedure until a minimum distortion indication is obtained.

d. Wave Shaper --

1. Using the distortion analyzer, monitor the appropriate front panel OUT test jack.

2. Remove the signal input to the VCO.

3. Adjust potentiometers R74 and R71 (in that order) alternately, until a minimum distortion indication is obtained.

5.4 DRAWINGS

The 4530 drawings are arranged in descending order starting with the top assembly diagram and continuing through all subassembly, schematic, and wiring diagrams. Table 5-3 lists the drawings, the order in which they appear in this manual, the EMR drawing numbers, and the page numbers.

Subassemblies and/or components of the assemblies on the assembly drawings are identified by reference numbers within the balloons. These numbers correspond to item numbers on the associated parts list in Section 6 of this manual. The assembly drawing and associated parts list are identified by the same number. For example, the subassemblies shown in the top assembly drawing, 14991, are listed by item number on PL-14991 in Section 6. This

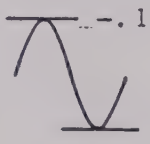
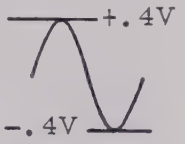
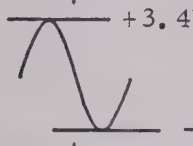
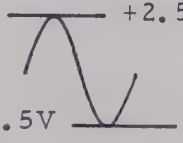
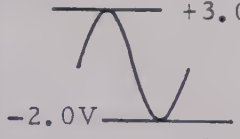
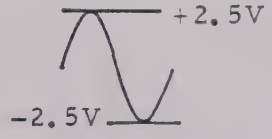
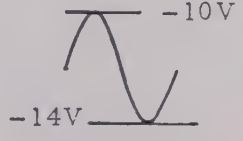
This parts list outlines the subassemblies by name and assembly drawings in which the subassemblies are illustrated. For example, item 2 on drawing 14991 is identified on PL-14991 as the front panel assembly which is illustrated independently on EMR drawing 14990. The parts on this assembly are listed on PL-14990. Subsequent assembly drawing and parts breakdown is performed in the same manner.

Certain assembly drawings illustrate more than one configuration of the assembly. When this is the case, dash (-) numbers are used following the assembly number to identify the configuration. An APPLICATION Chart in the lower center of the assembly drawing lists the configurations of the assembly and the particular units on which the assemblies are used. The dash numbers also identify the parts lists in Section 6 for the various configurations.

Table 5-1. Regulator Card Transistor Voltage Measurements (Ref. EMR Drawing 15797)

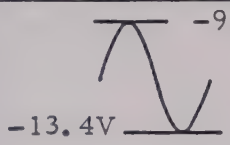
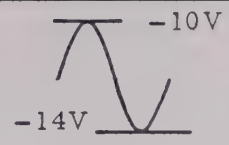
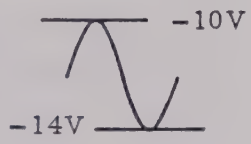
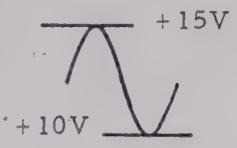
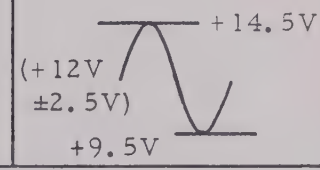
COMPONENT	EMITTER	BASE	COLLECTOR
NOTE Voltage levels provided are typical for one +18-volt regulator and one −18-volt regulator. Voltage levels at corresponding components in the remaining regulators are identical to those provided below.			
+18-VOLT REGULATOR			
Q1	2V P-P DC LEVEL 37V DC	36.2V DC	18.6V DC
Q3	8.4V DC	9V DC ±5%	36.2V DC
Q4	8.4V DC	9V DC	18V DC
−18-VOLT REGULATOR			
Q5	−8.4V DC	−9V DC ±5%	−36.2V DC
Q6	−8.4V DC	−9V DC	−18V DC
Q7	2V P-P DC LEVEL −37V DC	−36.2V DC −3[illegible] DC	−18.6V DC

Table 5-2. VCO Card Voltage Measurements and Waveforms (Ref. EMR Drawing 15794)

COMPONENT	EMITTER	BASE	COLLECTOR
	NOTE The following waveforms are based on an input of 10V peak-to-peak at a data frequency within the 4530 specifications. FREQ control set for center frequency and INPUT control set for full-bandwidth deviation. Deviation is ±40%.		
Q1	NA	SAME AS Q2 B	+12V DC
Q2			+12V DC
Z1	PIN 7 		
Q3		+2.5V DC	GRD
Q4	SAME AS Q3 E	-2.5V DC	GRD
Q5*			-18V DC
Q6*	+6.6V DC	+6.0V DC	

* These voltage levels are based on using a ±40% deviation unit. Levels will decrease for units with lower deviations.

Table 5-2 (Cont'd.). VCO Card Voltage Measurements and Waveforms (Ref. EMR Drawing 15794)

COMPONENT	EMITTER	BASE	COLLECTOR
Q22			-18V DC
Q14		SAME AS Q22 E	SUBCARRIER RATE
Q7		(SEE BELOW)	(SEE BELOW)
Q15	SAME AS Q14 E	SAME AS Q22 E	

NOTE

The following waveforms are based on no input signal to the VCO. Frequencies of the waveforms are at the subcarrier rate of the VCO.

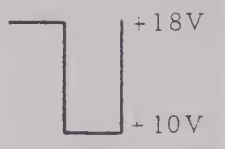
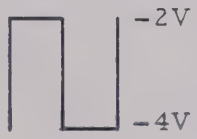
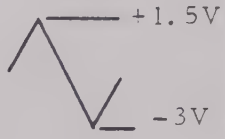
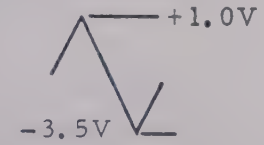
Q8	SAME AS Q14 C	-3.5V DC	
Q9	SAME AS Q14 C		
Q7	(See above--waveform is based on data input signal)	SAME AS Q15 C	SAME AS Q9 C
Q10		SAME AS Q9 C	+18V DC

Table 5-2 (Cont'd.). VCO Card Voltage Measurements and Waveforms (Ref. EMR Drawing 15794)

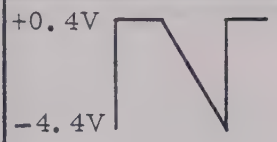
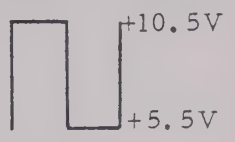
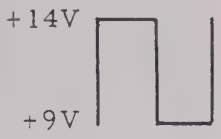
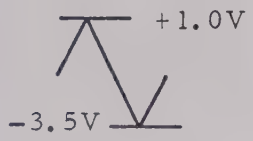
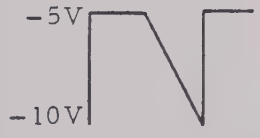
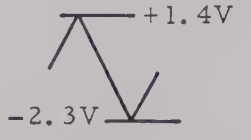
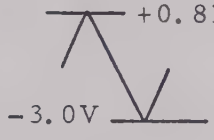
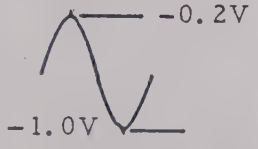
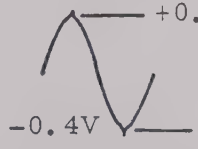
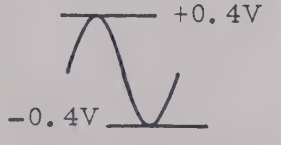
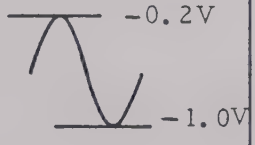
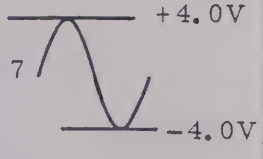
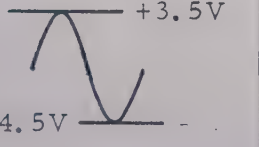
COMPONENT	EMITTER	BASE	COLLECTOR
Q11		SAME AS Q10 E	
Q12	SAME AS Q11 E		
Q13		SAME AS Q9 C	+18V DC
Q16	-12.6V DC	-12V DC	
Q24	-12V DC	-11.4V DC	GRD
Q17			-18V DC
Q18			+18V DC
Q19			-18V DC
Z2			
Q20		SAME AS Z2-7	+18V DC

Table 5-2 (Cont'd.). VCO Card Voltage Measurements and Waveforms (Ref. EMR Drawing 15794)

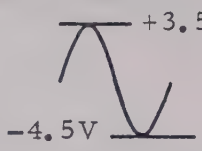
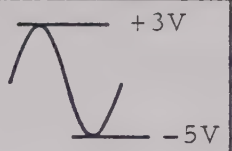
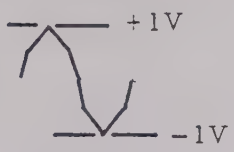
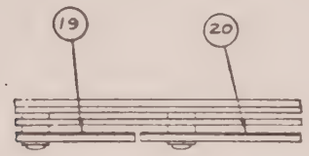
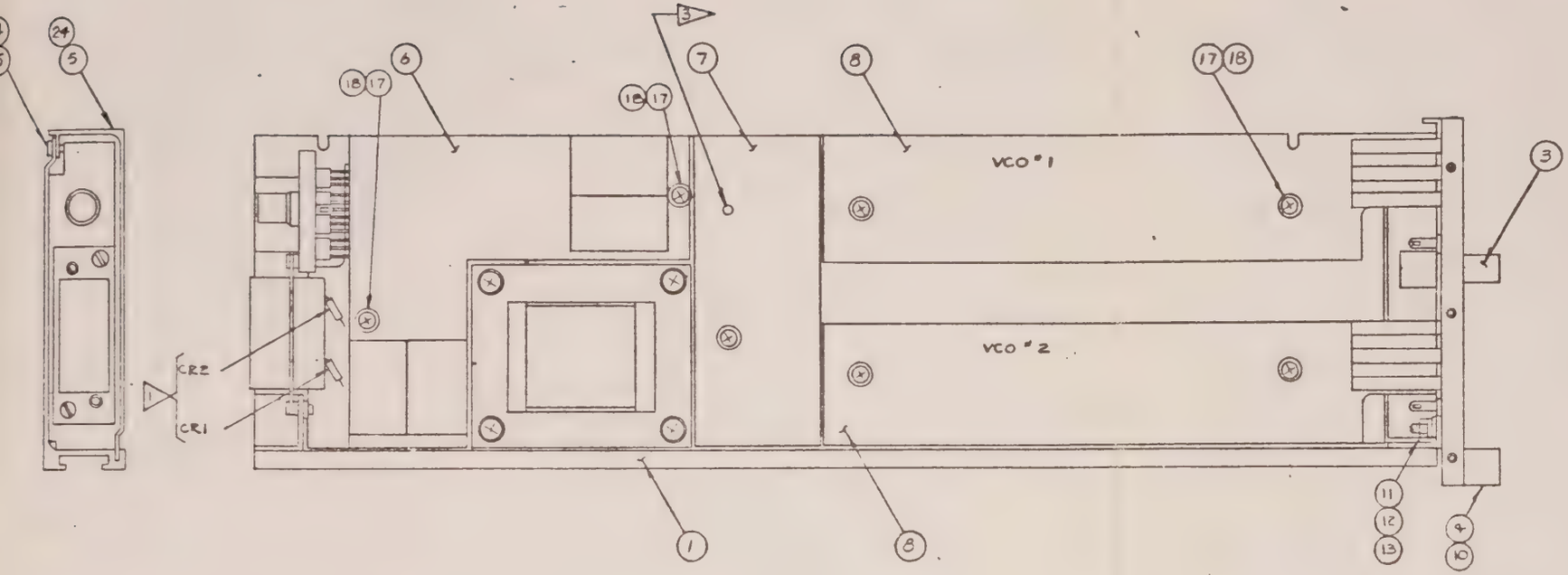
COMPONENT	EMITTER	BASE	COLLECTOR
Q21			-18V DC
JUNCTION OF CR12/CR14			

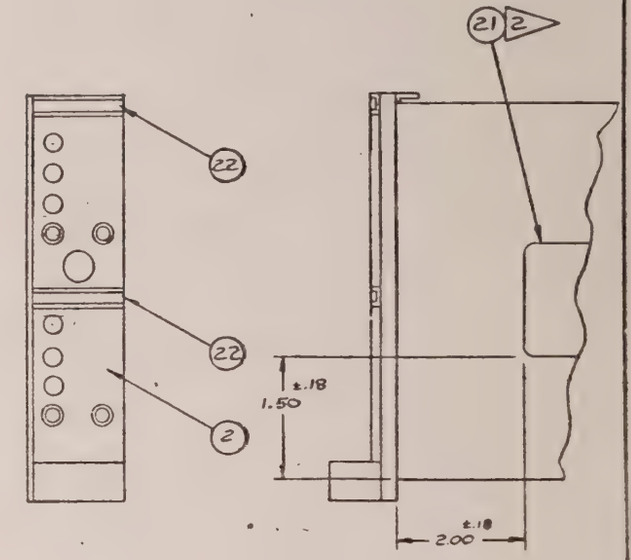
Table 5-3. List of Drawings

NAME	NUMBER	PAGE NO.
Model 4530 Dual VCO Oscillator Assembly	14991	5-15
Model 4530 Dual VCO Chassis Assembly	14992	5-16
Interconnection Printed-Wiring Assembly	15908	5-17
Front Panel Assembly	14990	5-18
Regulator Card Printed-Wiring Assembly	15799	5-19
Schematic	15797	5-20
Calibrate Card Printed-Wiring Assembly	15906	5-21
Schematic	15800	5-22
Schematic	16131	5-23
Schematic	16130	5-24
VCO Card Printed-Wiring Assembly	15796	5-25
Schematic	15794	5-26
Model 4530 System Schematic	16135	5-27

REVISIONS				
SYM	DESCRIPTION	APPROVED	DATE	APPROVED
A	SEE ECO 5 N 36-09 & 3-64	E.D		
B	REC ADDED - 12-30-64 CONFG. 7-2-65			
C	R/C ADDED 5-66-7 CONFG 11-25-69	N/A	11-25-69	
D	ECO 39357 (1-20-70) ADDED ITEMS 19 & 20		1-20-70	
E	R/C ADD VCO #1 & #2 IDENT. TO FID	N/A	9-5-70	
F	ECO 41280 ADD ITEM 20 & NOTE 2			
G	ECO 42705 ADD ITEM 22		7-3-71	
H	ECO 49146 ADDED CR1 CR2 & FLAG NOTE 1		3-5-73	
J	ECO 52047 DELETE ITEM 7			
K	ECO 56175 ADD ITEM 24 & 25		8-8-78	
L	ECO-0300133 ADD NOTE 4	5-11-81	5-18-81	







NOTES:

1. INSTALL CR1 & CR2 PER WIRING SCHEMATIC 16135. SLEEVE LEADS USING ITEM 23 AR.
2. APPLY INFORMATION TO NAMEPLATE PER EMR 13406, CLASS B, TYPE 15.
3. MOUNTING SCREW OR HARDWARE MAY NOT BE USED, THIS HOLE.
4. ITEM 25 (EMR LOGO) NOT SHOWN.

-7	-6	-5	-4	-3	-2	-1	BASIC	CHG LTR	PART NO	DESCRIPTION	PART CLASS	MFG CODE	ITEM OR SYMBOL
									89-83-00053	FOR PARTS LIST SEE PL- 14991-7			
									89-83-00052	PL- 14991-6			
									89-89-00051	PL- 14991-5			
									89-83-00049	PL- 14991-4			
									89-83-00047	PL- 14991-3			
									89-83-00046	PL- 14991-2			
									89-83-00045	PL- 14991-1			
									89-83-00044	FOR PARTS LIST SEE PL 14991			

REQUIRED — LIST OF MATERIALS

-7	FINAL	1330-83 (PA)	
-6		4-24-68	
-5		4-23-68	
-4			
-3			
-2		6-7-67	
-1		4-24-67	
BSC	FINAL	4-24-67	

UNLESS OTHERWISE SPECIFIED
DO NOT SCALE DRAWING
MATERIAL
TREATMENT OR FINISH
APPLICATION
DO NOT APPLY PARTING PER
SIZE APPROX AS SHOWN

DRAWN BY B. FAIRBROTHERS 2-24-68
DESIGNER
CATEGORY
DESIGN ENGINEER
PROJECT ENGINEER 11/19/68
APPROVED
APPROVED

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OSC ASSEMBLY, DUAL VC MODEL 4530

EDC

CODE IDENT		REV
0614	D 14991	L
SCALE		SHEET

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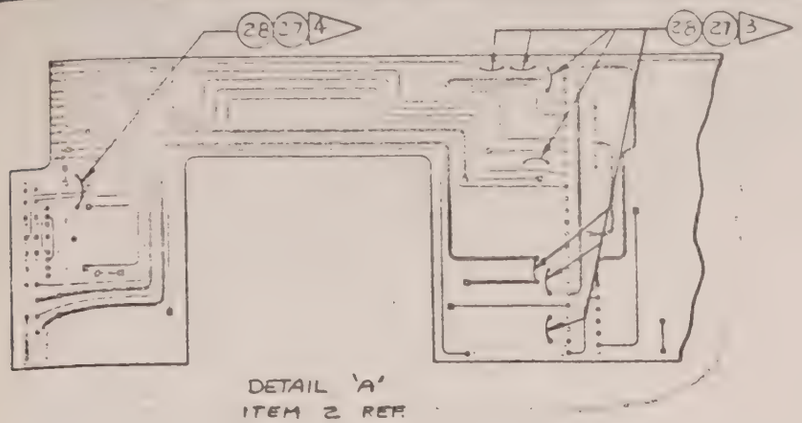
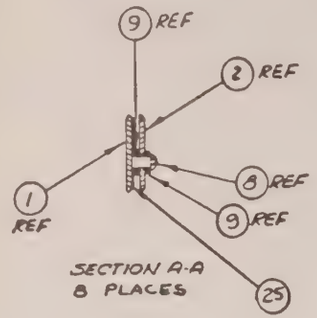
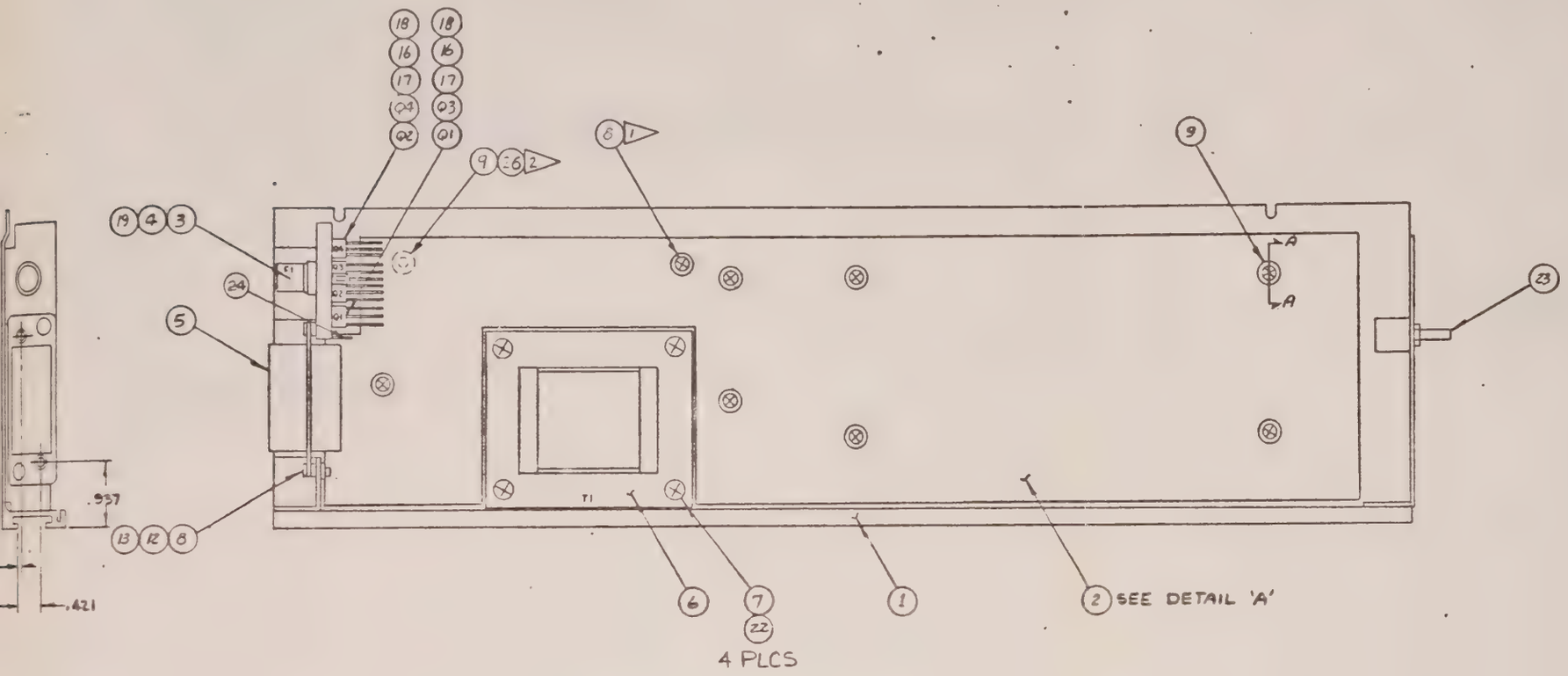
REVISIONS				
BY#	DESCRIPTION		DATE	APPROVED
A	SEE ECO S N 3-172	[illegible]	[illegible]	[illegible]
B	REC ADDED - CONFIG 9-268	N/A	[illegible]	[illegible]
C	RVC ADDED-2 CONFIG 11-65-69	N/A	11-3-69	[illegible]
D	ECO 39357 (1-20-70) ADDED ITEM 25		1/29/70	[illegible]
E	ECO 41020 DELETE ITEMS 10 & 21, STD ITEM 7	[illegible]	[illegible]	[illegible]
F	ECO 41241 ADD DETAIL 'A'	1 & UP	10-1-70	[illegible]
G	ECO 41563 CHNG NOTE 2	1 UP	12-6-70	[illegible]
H	ECO 42257 ITEM 23 WAS ITEM 26	1 & UP	2-2-71	[illegible]
J	ECO 48797 DELETE ITEM 20	1-22-74	1-15-74	[illegible]



DETAIL 'A'
ITEM 2 REF.



SECTION A-A
8 PLACES



4 PLCS

NOTES:

1. ITEM 8 TO BE REMOVED AT FINAL ASSEMBLY AND INSTALLED FOR CARD RETAINING.
2. INSTALL ITEM 9 APPROX WHERE SHOWN BETWEEN ITEM 25 & ITEM 2 USING ITEM 26 BOND TEM 9 TO ITEM 25.
3. FOR MODEL 4530-9X INSTALL JUMPERS WHERE SHOWN.
4. FOR MODEL 4530-X4 INSTALL JUMPER FOR INT. CAL LOCAL CONTROL.

			042-89-C0151	FOR PART LIST SEE PL 14992-2			
			042-89-C0092	FOR PARTS LIST SEE PL 14992-1			
-2	-1	BASIC	042-89-C0092	FOR PARTS LIST SEE PL 14992			
REQUIRED			PART NO	DESCRIPTION	PART CLASS	MFG CODE	ITEM OR SYMBOL

LIST OF MATERIALS

-2	9991-1	4530 ASSY
-2	[illegible]	[illegible]
-2	[illegible]	4530-9
[illegible]	[illegible]	[illegible]
-1	[illegible]	[illegible]
BSC	11931	4530
DASH NO.	DETAIL NO.	DESCRIPTION

APPLICATION
DO NOT APPLY PART NO. PER
CREATE ASSEMBLY AS SHOWN

UNLESS OTHERWISE SPECIFIED
TOLERANCES: DECIMALS, ANGLES, SURFACE FINISH
DO NOT SCALE DRAWING

MATERIAL
TREATMENT OR FINISH

DRAWN BY: E. FAIRBROTHER 5-24-68
DESIGNER: D. Bailey
CHECKED: [illegible] 6-6-68
DESIGN ENGINEER:
PROJECT ENGINEER: [illegible] 7/9/68
APPROVED:
APPROVED:

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ELECTRO-MECHANICAL RESEARCH, INC. · SARASOTA, FLORIDA

CHASSIS ASSEMBLY MODEL 4530, DUAL VCO

CODE IDENT. NO.	SIZE	DWG NO.	REV
06141	D	14992	J
SCALE 1:1	042-89-[illegible]	SHEET 1 OF 1	

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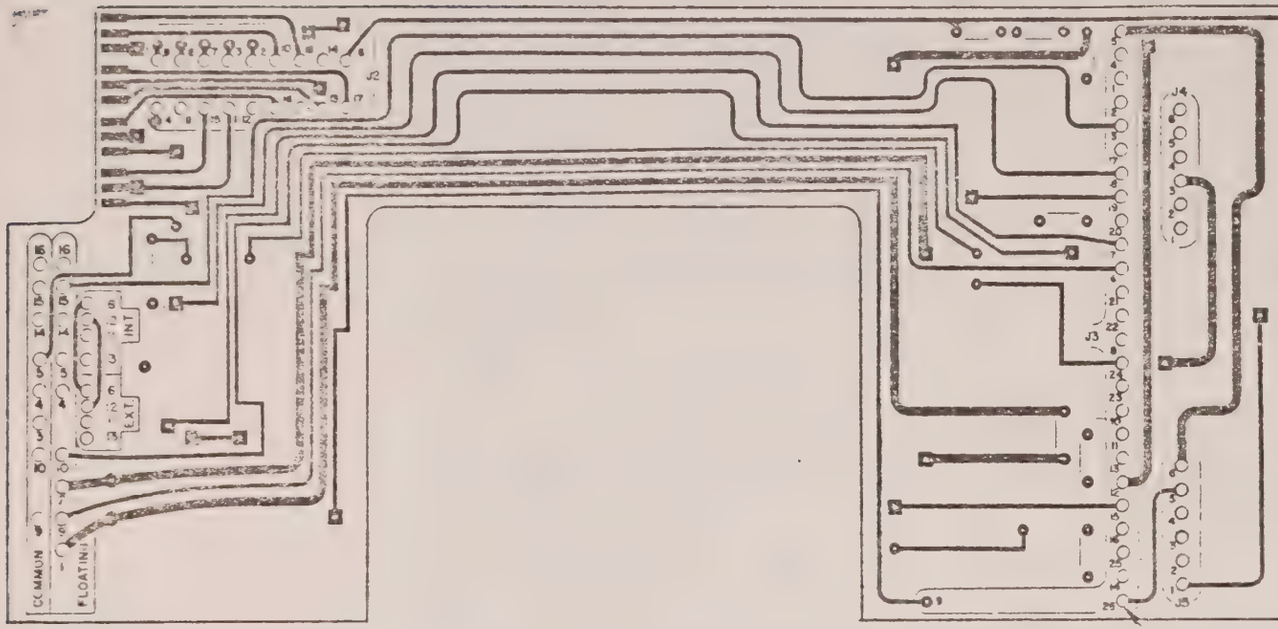
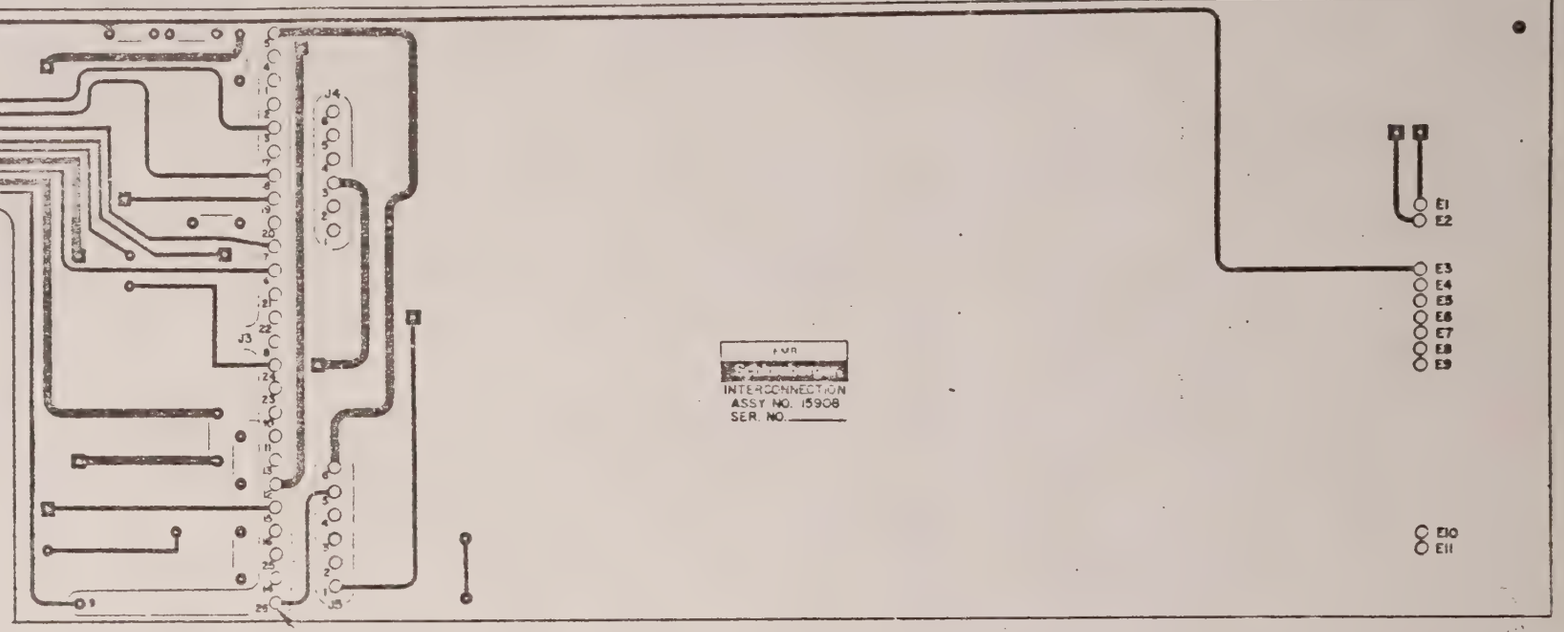
3/2/73 DOZALID

8 | 7 | 6 | 5 | 4 | 3 | 2 | 1

ARTWORK REVISION KEY

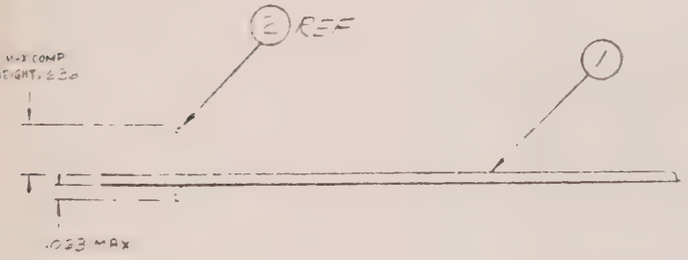
REVISIONS





FOR
INTERCONNECTION
ASSY NO. 15908
SER. NO. _____

15908



(2) TYP (57 PLACES)

PARTS LIST

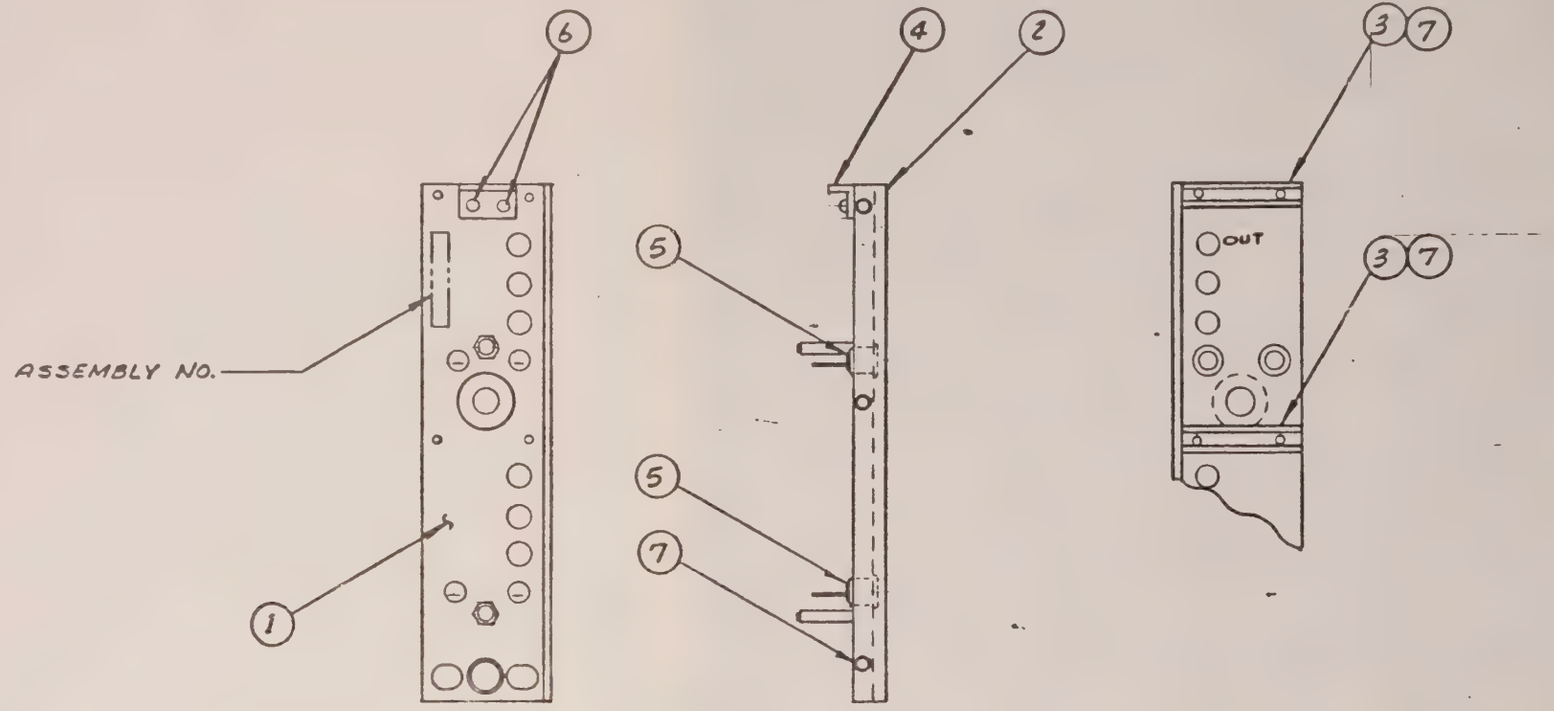
TELEMETRY

PRINTED-WIRING ASSEMBLY
INTERCONNECTION

D | .141 | 15908 | C

NOTICE TO PERSONS RECEIVING THIS DRAWING: THIS DRAWING CONTAINS INFORMATION

REVISIONS				
SYM	DESCRIPTION	SERIAL EFFECTIVE	DATE	APPROVED
A	ECO 47744 REVISED PANEL MARKING 36° WAS 30° AROUND SWITCH	869 & UP	7-17-73	
B	ECO 63218 DELETE NOTE 1	FUTURE P.O.D.	3-27-81	



14990

THIS LIM FOR REF. ONLY FOR P/L SEE EDP P/L 14990

		REF	C	MYL-14990	MARKING			8
		7		229-02-00216	SCREW			7
		2		229-02-00217	SCREW			6
		4		143-38-00006	JACK			5
		1	C	6012	BRKT, LOCATING			4
		2	B	15718	IDENT, RETAINER			3
		1		14993	STRIP			2
		1	C	15717	PNL ASSY. FRONT			1
-2	-1	BASIC	DWG SIZE	PART NO.	DESCRIPTION	PART CLASS	MFG. CODE	ITEM OR SYMBOL
REQUIRED				LIST OF MATERIALS				

BSC	14991	4530
DASH NO.	NEXT ASSY NO.	USED ON

APPLICATION

DO NOT APPLY PART NO. PER
EMR 13406 CL-A, TYPE I
LOCATE APPROX AS SHOWN

UNLESS OTHERWISE SPECIFIED
TOLERANCES — DECIMALS .XX = ±.010, .XXX = ±.005 — ANGLES ±1° — SURFACE FINISH 125
ALL DIMENSIONS ARE IN INCHES
THREADS CLASS 2A OR 2B PER MIL-S-7742
REMOVE BURRS AND BREAK EDGES .010 MAX
HOLE TOLERANCES PER EMR-STANDARDS
DIMENSIONS INCLUDE APPLIED FINISH
EMR WORKMANSHIP STANDARDS APPLY
DO NOT SCALE DRAWING

MATERIAL

TREATMENT OR FINISH

		DATE
DRAWN BY	B. FAIRBROTHER	5-20-68
DESIGNER		6-6-68
CHECKER		6-6-68
DESIGN ENGINEER		
PROJECT ENGINEER	John S. Nerken	6/19/68

APPROVED

APPROVED

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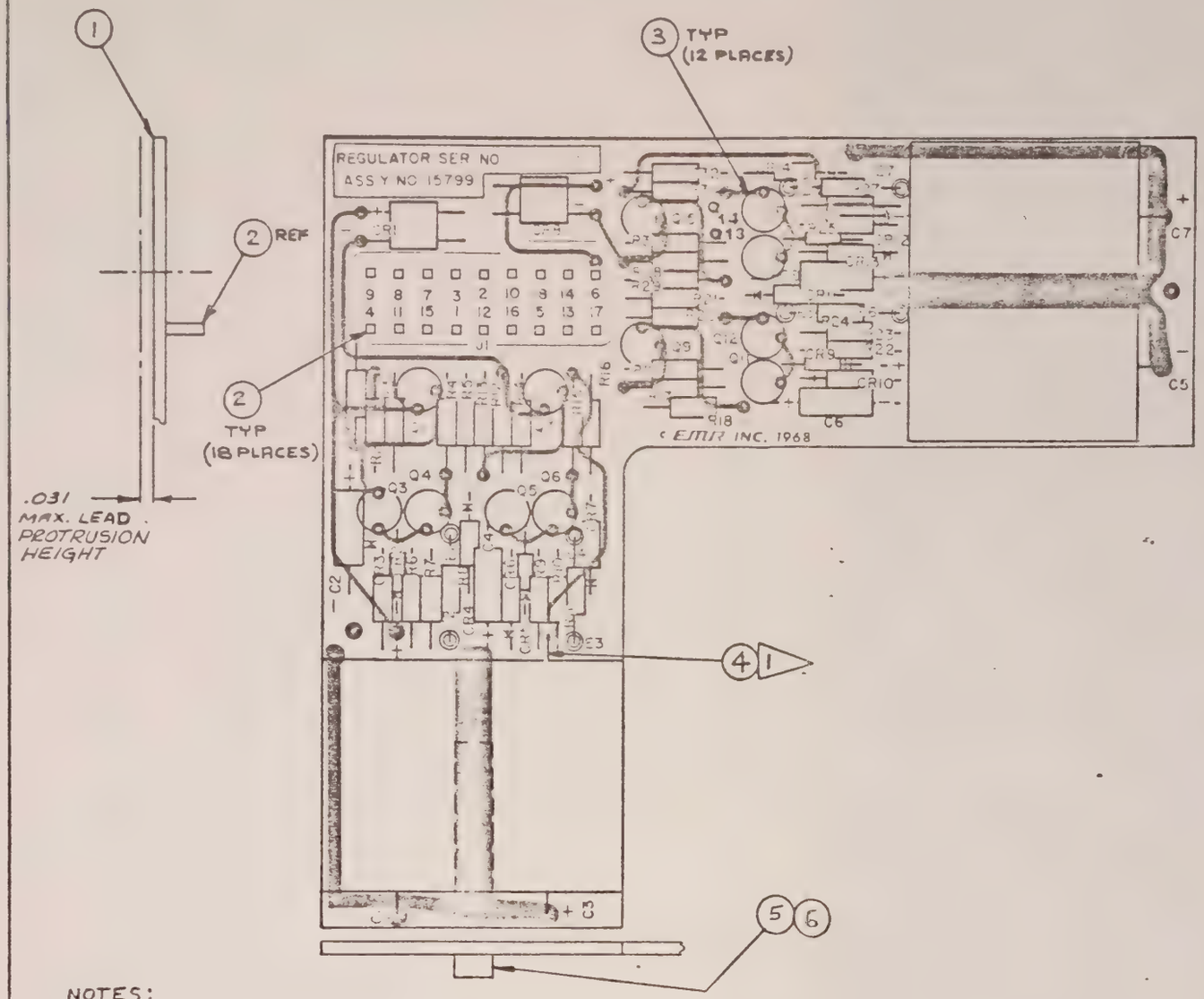
EMR, INC. 1968

ASSEMBLY PANEL, FRONT

BDC

CODE IDENT NO.	SIZE		REV
06141	C	14990	B
SCALE 1/1	191-E?-00246	SHEET 1	OF 1

REVISIONS				
SYM	DESCRIPTION	SERIAL EFFECTIVE	DATE	APPROVED
A	ECO 41108 ADD ITEM 4 & NOTE 1	131 & UP	7-14-70	
B	ECO 42518 ADD .031 PROTRUSION HEIGHT	240 & UP	5-20-71	



NOTES:

1. SLEEVE INSIDE LEADS (TOWARDS CENTER OF CARD) ON C1, C3, C5 & C7 USING ITEM 4.

-2	-1	BASIC		PART NO.	DESCRIPTION	PART CLASS	MFG CODE	ITEM OR SYMBOL
		X	A	205-89-00494	FOR PARTS LIST SEE P/L 15799			
REQUIRED					LIST OF MATERIALS			

BSC 4530

UNLESS OTHERWISE SPECIFIED
DO NOT SCALE DRAWING
MATERIAL
TREATMENT OR FINISH
DO NOT ASSEMBLE PER
LOCATE AS SHOWN

DRAWN L.B. Ogle 7-5-68
APPROVED
APPROVED

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PRINTED-WIRING ASSEMBLY REGULATOR

EDC

CUSTOMER NO	CODE		REV
06141	C	15799	B
SCALE 8/1	205-89-00494		SHEET 1 OF 1

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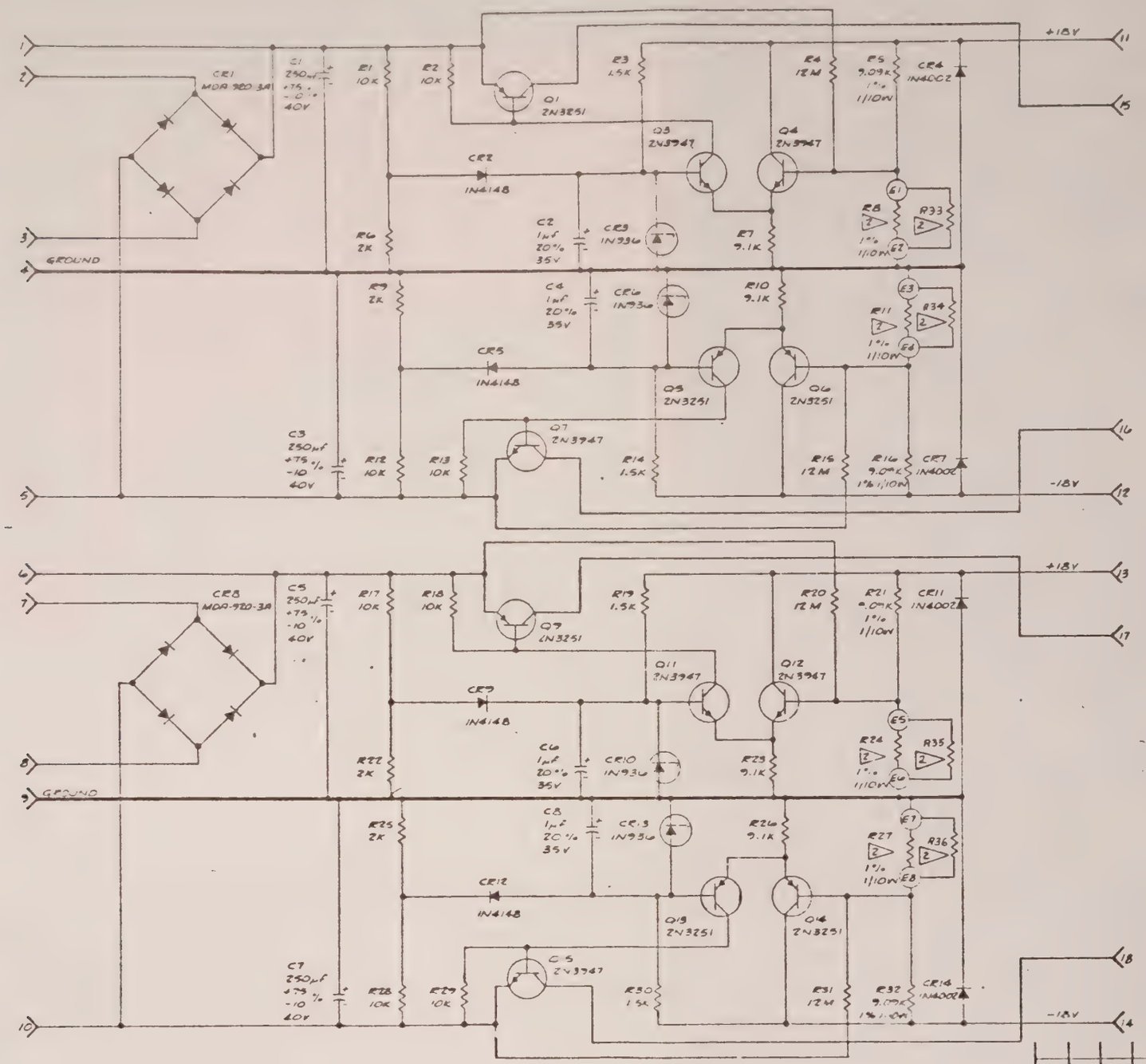
REVISIONS				
SYM	DESCRIPTION		DATE	APPROVED
A	ECO 12-77 (7-22-77)		7/22/77	



NOTES:

1. ALL RESISTOR VALUES ARE IN OHMS (K=1000)(M=1,000,000) AND ARE 5% 1/4W UNLESS NOTED

Z TEST VARIABLE

E8			
Q15			
CR14			
C8			
NO LAST USED NO. NOT USED			
COMPONENT CHART			

			PART NO.	DESCRIPTION

LIST OF MATERIALS

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UNLESS OTHERWISE SPECIFIED

DRAWN Peter Salter 1-7-68

ENGR William Salter 1-7-68

APPROVED

EDMUND SCIENTIFIC CO. SARASOTA DIVISION ELECTRO-MECHANICAL RESEARCH, INC. • SARASOTA, FLORIDA

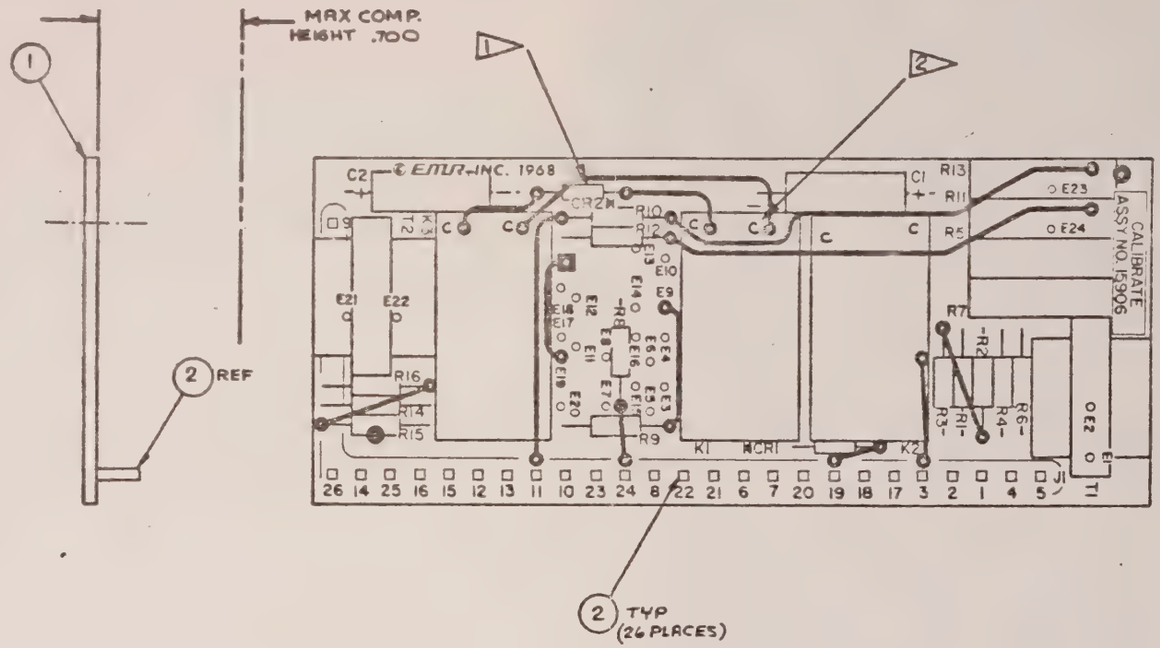
PRINTED-WIRING SCHEMATIC REGULATOR

EDC

05	D	15797	A

SCALE | SHEET 1 OF 1

REVISIONS				
SYM	DESCRIPTION	SERIAL EFFECTIVE	DATE	APPROVED
A	R/K UPDATE USED ON BLOCK	N/A	3-17-70	
B	PCD CHG- CLARIFY E23 & E24 HOLE LOCATION	N/A	9-3-71	



CONFIG.	JUMPERS (ITEM 3 AND 4)
15906	E3-E4, E5-E6, E7-E8, E19-E20
15906-1	E9-E10, E23-E24, E11-E12, E15-E16
15906-2	E9-E10, E23-E24, E11-E12, E15-E16, E21-E22
15906-3	E7-E8, E19-E20, E17-E18, E13-E14
15906-4	E7-E8, E19-E20, E17-E18, E13-E14, E1-E2, E21-E22

-4	-3	-2	-1	BASIC	PART NO	DESCRIPTION	PART CLASS	MFG CODE	ITEM OR SYMBOL
				A	205-89-00499	FOR PARTS LIST SEE P/L-15906-4			
				A	205-89-00498	FOR PARTS LIST SEE P/L-15906-3			
				A	205-89-00497	FOR PARTS LIST SEE P/L-15906-2			
				A	205-89-00496	FOR PARTS LIST SEE P/L-15906-1			
				A	205-89-00495	FOR PARTS LIST SEE P/L 15906			

REQUIRED

LIST OF MATERIALS

NOTES:

1. INSTALL JUMPER IN PLACE OF CR2 ON -1 & -2 CONFIGURATIONS.
2. C- DENOTES COIL END OF RELAY.

-3	14991-7	4530-93-84
-1	-6	-82
BSC	-5	-81
-4	-4	-93-84
-3	-3	-93-83
-2	-2	-92
-1	-1	-01,72
BSC	14991	4530-01-71
ASSY NO.	REV & ITEM NO.	DEL'D

ADD ITEM

DO NOT APPLY PART NO. PER

LOCATE APPROX. AS SHOWN

UNLESS OTHERWISE SPECIFIED

TOLERANCES

DECIMALS ANGLES SURFACE FINISH

DO NOT SCALE DRAWING

MATERIAL

TREATMENT OR FINISH

DRAWN BY [illegible] DATE 9/2/68

DESIGN [illegible] 9-6-68

CHECKED [illegible] 9-10-68

DESIGN ENGINEER

PROJECT ENGINEER [illegible]

APPROVED

APPROVED

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PRINTED-WIRING ASSEMBLY CALIBRATE

EDC

CODE IDENT NO	SIZE		REV
06141	C	15906	B
SCALE 2/1	205-89-00495	SHEET 1 OF 1	

EMR 3-2 1/4 OZALID

A	ECO 13000 (8-10-67)	1 & UP	4/3/68	
B	ECO 14684 (8-10-68)			
C	ECO 38607 (1-17-69) C14C2 WERE 6.8uF 35V ±20%	ENGR UP	2-6-2	GEST

OUTPUT #1 1
OUTPUT #1 TEST POINT 2
OUTPUT RETURN #1 3
R1 33
R2 180
R3 1K
E1
E2
T1
17 OUTPUT #1
C1 15uF 20V ±20%
E3
E4
DATA IN #1 6
DATA IN #2 8
E5
E6
21 INPUT #1
22 INPUT #2
23 COMMON #2
24 COMMON #1
E7
E8
DATA IN RTN #1 10
-18 VDC #1 11
-18 VDC #2 12
DATA IN RTN #2 13
E9
E10
C2 15uF 20V ±20%
T2
OUTPUT RTN #2 14
OUTPUT #2 15
OUTPUT #2 TEST POINT 16
R5 39
R6 180
R4 1K
26 OUTPUT #2
E21
E22

NOTES:

ADD JUMPER FOR NO CAL. MODELS 4530-01, 71 & 81

ALL RESISTORS ARE IN OHMS (K=1000), 1/4 W. ±5% UNLESS NOTED.

THESE NO'S MAY BE USED ON 15726 ASS'Y BUT ARE NOT USED ON THIS SCHEMATIC.

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850	15906	4530-81	
850	15726	4530-71	
850	15706	4530-01	

FAIRCHILD DIVISION SYSTEMS & E.T.E.C. INC. 1968

PRINTED-WIRING SCHEMATIC
"CALIBRATE" CARD WITHOUT CALIBRATION (10C)

08714 D 15800 C

SCALE NONE 1 1

A	ECO 33601 (4-17-69)	1 of UP	11/3/69	
B	ECO -- 33 -- -- 4)			
C	ECO 38608 (4-17-69) CIRCUIT HAS COMP 33 V	SN 81 & UP	2-9-70	

OUTPUT #1 1
OUTPUT #1 TEST POINT 2
OUTPUT RETURN #1 3
DATA IN #1 6
EXT. CAL. VOLTAGE 7
DATA IN #2 8
EXT. CAL. VOLTAGE RTN 9
DATA IN RTN #1 10
-18 VDC #1 11
-18 VDC #2 12
DATA IN RTN #2 13
OUTPUT RTN #2 14
OUTPUT #2 15
OUTPUT #2 TEST POINT 16

R1 39
R2 180
R3 1K
R4 39
R5 180
R6 1K

T1
T2
K1
K2
K3
CR1 IN4148
CR2
C1 15 MF 20 V ±20%
C2 15MF 20V ±20%

17 OUTPUT #1
18 CAL. COMMAND RTN
19 CAL. COMMAND (+)
20 CAL. COMMAND (0)
21 INPUT #1
22 INPUT #2
23 COMMON #2
24 COMMON #1
25 CAL. COMMAND (-)
26 OUTPUT #2

NOTES:

1. USED ON -1 CONFIGURATION ONLY. 4530-0X -7X AND -8X
2. ADD JUMPER ON -2 CONFIGURATION MODELS 4530-9X
3. ADD JUMPER FOR EXTERNAL CAL. MODELS 4530-X2
4. REPLACE CR2 WITH JUMPER FOR EXTERNAL CAL. MODEL 4530-X2

ALL RESISTORS ARE IN OHMS (K=1000) 1/4 W. ±5% UNLESS NOTED.

3 THESE NO'S MAY BE USED IF SPOC ASS'Y BUT ARE NOT ON THIS SCHEMATIC

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PRINTED-WIRING SCHEMATIC
"CALIBRATE" CARD
EXTERNAL CALIBRATE (EDC)

0614: D 16131 C

SCALE: NONE SHEET 1 OF 1

A	ECO 33715 (8/21/68)	6# UP	2/4/68	10
B	ECO 34186 (8/26/68)	1# UP	3/4/68	10
C	ECO 38606 (11-17-69) C1 & C2 WERE .68UF 35V ±20%	SHELF UP	2-6-70	SCOTT

OUTPUT #1 1 — R1 39, R2 180 — E1, E2 — T1 — 17 OUTPUT #1

OUTPUT #1 TEST POINT 2 — R3 1K

OUTPUT RETURN #1 3

18 CAL. COMMAND RTN

19 CAL. COMMAND (+)

+18VDC #1 4 — R4 — R5 1K, 10%, 1W — K2

+18VDC #2 5 — R6 — R7 1K, 10%, 1W — K2

CR1 IN4148

C1 15UF 20V ±20%

DATA IN #1 6 — E4 — K1

20 CAL. COMMAND (o)

21 INPUT #1

DATA IN #2 8 — E5 — K1

22 INPUT #2

R8, R9

23 COMMON #2

24 COMMON #1

E7, E8, E9, E10, E11, E12, E13, E14, E15, E16, E17, E18

CR2 IN4148

25 CAL. COMMAND (-)

DATA IN RTN #1 10

-18 VDC #1 11 — R12 — R11 1K, 10%, 1W

-18 VDC #2 12 — R10 — R13 1K, 10%, 1W — K3

DATA IN RTN #2 13 — E19, E20

26 OUTPUT #2

OUTPUT RTN #2 14

C2 15 uf 20V ±20%

OUTPUT #2 15 — R15 39, R16 180

OUTPUT #2 TEST POINT 16 — R14 1K — T2 — E21, E22

E3, E6, E12, E16, E23, E24 — 2

16130

NOTES:

1. USED ON -3 CONFIGURATION ONLY. 4530-0X, -7X AND -8X
2. ADD JUMPER ON -4 CONFIGURATION MODELS 4530-9X
3. ADD JUMPER FOR INTERNAL CAL. MODELS 4530-X3 & X4

VOLTAGE AVAILABLE 1/10 W. RNC55C 1%	CALIB VOLT.	R8 R9	R4, R6 R10 R12
	0.5	280Ω	9.31K
	1.0	562Ω	9.09K
	2.0	1.10K	8.45K
	2.5	1.40K	8.06K
	5.0	2.80K	6.65K
	10.0	5.62K	3.92K

5 ALL RESISTOR ARE IN OHMS (K=1000) 1/4 W. ±5% UNLESS NOTED.

(16) THESE NO'S MAY BE USED ON 15906 ASSY BUT ARE NOT ON THIS SCHEMATIC.

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BSC	15906-4	4530-94
	-5	4530-93
	-6	4530-84
	-7	4530-83
	-8	4530-74
	-9	4530-73
	-A	4530-64
BSC	15906-B	4530-63

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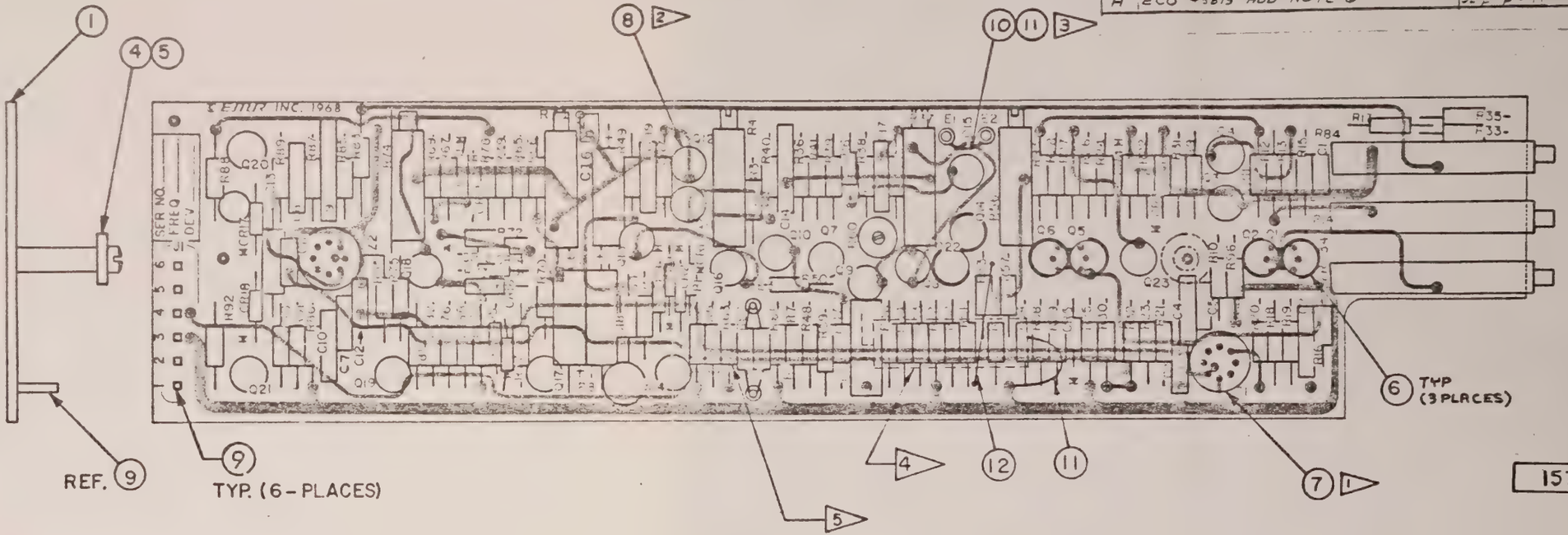
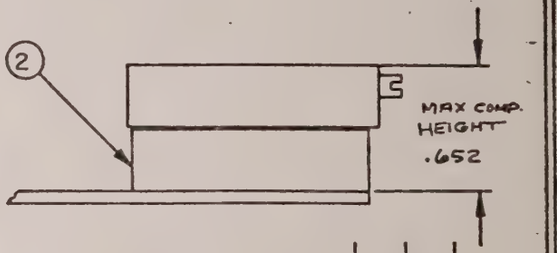
PRINTED-WIRING SCHEMATIC
"CALIBRATE" CARD
INTERNAL CALIBRATE
LOCAL OR REMOTE CONTROL

0614 D 16130 C

REVISIONS				
SYM	DESCRIPTION	STATUS LETTER	DATE	APPROVED
A	ECO S/N 33693 (INTERIM 11-5-68)	SEE ECO	11-5-68	
B	ECO S/N 35226 (11-5-68)	SEE ECO		
C	ECO 35315 (1-27-69) INTERIM	SEE ECO	1-12-69	
D	ECO 35530 (3-7-69)	EUP	3-7-69	
E	ECO 38233 (10-6-69) ADDED NOTE 4, ITEMS 11 & 12 AT NOTE 4 IN F/D	14UP	2-11-70	J GEST
F	RCD CHNG ADD ARROW AT C12	N/A	4-14-71	
G	ECO 44489 ADD 5 IN F/D & NOTES	3-22-72	3-17-72	
H	ECO 45819 ADD NOTE 6	SEE ECO	9-5-72	

REVISIONS				
SYM	DESCRIPTION	STATUS LETTER	DATE	APPROVED
J	ECO 50790 INTERIM		10-31-74	
K	ECO 50793 ADDED C20		11-4-74	
L	ECO-0400106 MOVED C7 DESIGNATION TO PROPER LOCATION	4-24-81	4-29-81	





NOTES:

1. FOR USE WITH Z1 AND Z2.
2. FOR USE WITH ALL TRANSISTORS.
3. JUMPER MAY BE REMOVED FOR UNITS ABOVE 50 KHz.
4. DASHED OUTLINE IS ALTERNATE POSITION FOR C15 WHEN THE CASE SIZE WILL NOT PERMIT MOUNTING IN STD POSITION. USE ITEMS 11 & 12 AS REQ'D.
5. R63 IS NON STD SPACING AND MUST BE SPACED .062 MIN. OFF PWB. USE HELICAL LEAD BENDS.
6. ALL COMPONENTS SHALL BE INSTALLED AND THE PWA SHALL BE AGED IN ACCORDANCE WITH DRAWING 11243. IN CASE OF COMPONENT FAILURE, ONLY THE FOLLOWING COMPONENTS MUST BE REPLACED WITH PARTS AGED ACCORDING TO DWG 11243; Q5, 6, 7, 8, 9, 14, 15, 22, 24, CR1, 2, 8, 9 & C15.

-2 REQUIRED	-1	BASIC	DWG SIZE	PART NO.	DESCRIPTION	PART CLASS	MFG CODE	ITEM OR SYMBOL
		X	A	205-89-00406	FOR PARTS LIST SEE P/L 15796			

LIST OF MATERIALS

BSC	14991	4530

UNLESS OTHERWISE SPECIFIED
TOLERANCES
DECIMALS .XX ± .03 .XXX ± .010
ANGLES ± 1/2°
SURFACE FINISH 125
ALL DIMENSIONS ARE IN INCHES
THREADS CLASS 2A OR 2B PER MIL-S-7742
REMOVE BURRS AND BREAK EDGES .010 MAX
DO NOT SCALE DRAWING

DRAWN BY Jim Graham 7-12-67
DESIGN ENGINEER
PROJECT ENGINEER
MATERIAL
APPROVED
TREATMENT OR FINISH
APPROVED
DO NOT APPLY PART NO. PER
LOCATE AS SHOWN

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PRINTED-WIRING ASSEMBLY
VCO

EDC

CODE IDENT NO	SIZE		REV
06141	C	15796	L
SCALE 2/1	205-89-00406	SHEET 1 OF 1	

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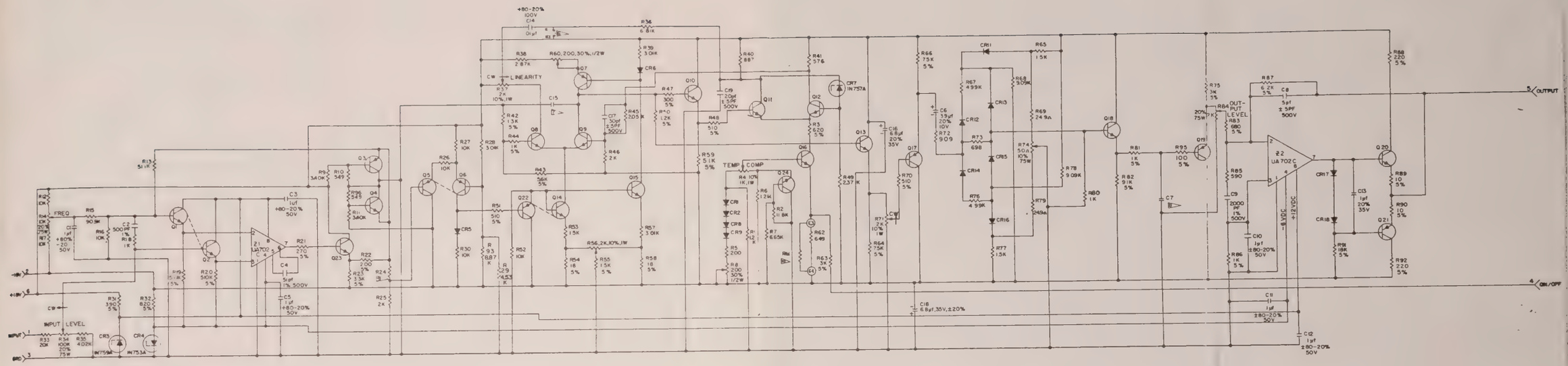
EMR 3 2 17A OZALID



NOTES:

UNLESS OTHERWISE SPECIFIED

1. ALL RESISTORS ARE TYPE RN55C, 1/10W, ±1% Ω IN OHMS
2. ALL 5% RESISTORS ARE TYPE RC07, 1/4 W Ω IN OHMS
3. ALL DIODES ARE IN4148
4. NPN TRANSISTORS ARE 2N3947
5. PNP TRANSISTORS ARE 2N3251
6. REMOVE JUMPER FOR CENTER FREQUENCIES ABOVE 50 kHz

▷ FREQUENCY VARIABLE $C(pf) \approx \frac{217}{f(kHz)} \times 10^{-3}$

▷ FREQUENCY VARIABLE $C(pf) \approx \frac{22}{f(kHz)} \times 10^{-3}$

▷ DEVIATION VARIABLE $R(K) \approx \frac{83.3}{D} - 2$

% DEV	R24 VALUE
10	19.2 K
5	7.5 K
2	2.87 K
1	1.47 K
.5	787 Ω
.2	402 Ω
.1	200 Ω

▷ TEST VARIABLE

REVISIONS			
NO.	DESCRIPTION	DATE	APPROVED
A	ECO #'s 34065 (8-3-68)		
B	ECO 34780 (8-30-68)		
C	ECO 35795 (1-21-69)		

PRINTED-WIRING SCHEMATIC
VCO

06141 | 15794 | C

PRINTED WIRING SCHEMATIC
VCO

REVISIONS				
SYM	DESCRIPTION		DATE	APPROVED
A	ECO 35103			
B	ECO 38436 (10-21-69) CORRECT WIRING AT PINS 3 & 15	1 & UP	2/11/70	
C	ECO 44016 CHG TO PINS 4 & 9		7-27-72	
D	ECO 44406 GEN'L UPDATE ADD #401	SEE E-D	9-10-72	
E	ECO 49140 ADDED CR1 CR2 & FLAG NOTES	#1, #401 & UP	9-6-72	

T1

J2

REGULATOR CARD

+26V 1
+26V 2

BLK
BLK

F1
1A

Q1 Q3 Q2 Q4

J1

CR2 IN4148

CR1 IN4148

CASE GRD

COMMON SUPPLY

FLOATING SUPPLY

INT CAL

EXT CAL

-18V 2
+18V 1
-18V 1
+18V 2

COMMON 1
COMMON 2
DATA IN 1
DATA IN 2
OUTPUT 1
OUTPUT RTN 1
OUTPUT 2
OUTPUT RTN 2
CAL CMD (+)
CAL CMD (0)
CAL CMD (-)
CAL CMD RTN
EXT CAL VOLTAGE
EXT CAL VOLTAGE RTN

J3
CALIBRATE CARD

J4
VCO1 CARD

-18V 1
+18V 1
COMMON 1
INPUT 1
OUTPUT 1
INHIBIT

J5
VCO 2 CARD

-18V 2
+18V 2
OUTPUT 2
COMMON 2
INPUT 1
INHIBIT

+26V

+CAL
0 CAL
-CAL
ON
OFF
E3
J1-2C

CAL CMD (+) E4
CAL CMD (0) E6
CAL CMD (-) E7
E8
J1-1C
E5

OUTPUT 1 E1 TP1
OUTPUT 2 E11 TP3
E2
OUTPUT RTN 1 TP2
E10
OUTPUT RTN 2 TP4

S1
REAR VIEW
1C 2C

NOTES:

1. INSTALL JUMPER FOR INT. CAL. LOCAL CONTROL. (MODEL 4530-X4)
2. INSTALL JUMPERS WHEN COMMON SUPPLY IS USED. 7 REQD (MODEL 4530-9X)
3. WIRE TO CORRESPONDING NUMBERS IN THE APPROPRIATE AREAS ACCORDING TO MODEL CONFIGURATION. EXAMPLE: FOR FLOATING SUPPLY MODEL, WIRE TO CORRESPONDING NUMBERS IN THE "FLOATING SUPPLY" AREA.
4. WIRE TO S1, PINS 3, 4 & 5 FOR INTERNAL CAL, & CCAL CONTROL ONLY. (MODELS 4530-X4)
5. FOR MODEL 4530-X2 REPLACE WIRE FROM J1P12 WITH CR1 AND ADD CR2 FROM J1P6 TO INTERCONNECT CARD PIN 12.

-2 REQUIRED	-1	BASIC	DWG SIZE	PART NO.	DESCRIPTION	PART CLASS	MFG CODE	ITEM OR SYMBOL

LIST OF MATERIALS

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R&C 11991	4530	
DASH NO	NEXT ASSY NO	USED ON

UNLESS OTHERWISE SPECIFIED
TOLERANCES
DECIMALS ANGLES FRACTIONS
DO NOT SCALE DRAWING

DRAWN BY B.F. BROTHER 6-1-68
DESIGNER
CHECKED
CRYOGEN ENGINEER
PROJECT ENGINEER 9/23/69

MATERIAL
TREATMENT OR FINISH
APPROVED
APPROVED

APPLICATION
DO NOT AFFECT PART NO PER
LOCATE APPROX AS SHOWN

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SYSTEM SCHEMATIC MODEL 4530

EDS

CODE IDENT. NO.	SIZE	DWG NO.	REV
06141	D	16135	E

SCALE NONE SHEET 1 OF 1

2175 BOZALID

SECTION 6

PARTS LIST AND RECOMMENDED SPARES

6.1 GENERAL

This section contains information concerning parts replacement, spares provisioning, and parts ordering for the EMR 4530. A complete list of the parts information is contained in Table 6-1 and described in paragraph 6.2. Recommended spares, spares provisioning information, and parts ordering information are contained in paragraphs 6.3, 6.4, and 6.5, respectively.

6.2 PARTS LIST DESCRIPTION

6.2.1 Variable Chart

The variable chart, EMR drawing 14993, contains the top level parts information for the 4530. This drawing provides the complete model number of the unit and information describing the variable digits of the model number. The tables on the top of the model number illustrate all available versions of the 4530 and the corresponding model numbers. The lower left table under the model number contains EMR parts list numbers and part numbers for the various models. Knob, handle, and trim parts information is contained in the lower right table under the model number.

6.2.2 Parts List

The parts lists in this section are provided in descending order starting with the top assembly parts lists and continuing through all subassemblies and components. A complete tabulation of the parts lists and the order in which they appear in this section are contained in Table 6-1. Table 6-1 also contains the parts list number, used on information, and the page number on which each parts list starts.

Each parts list number corresponds to the assembly number and drawing number in which the parts are illustrated. Drawings illustrating the parts in the parts lists are contained in Section 5 of this manual. For example, the parts listed in PL-14991 are illustrated on EMR drawing 14991 in Section 5. Certain assemblies and subassemblies contain dash (-) configurations of the assembly, e.g., PL-14991-1. Dash numbers are used to identify different configurations of the same assembly. However, all parts listed on PL-14991, 14991-1, etc., are illustrated on EMR drawing 14991.

The parts list for each top assembly (14991, 14991-1, etc.) contains a listing of all subassemblies in the configuration. The subassemblies are identified by an item number in the ITEM NO. column. These item numbers correspond to numbers in the reference balloons on the top assembly drawing 14991.

The subassemblies are broken down in separate parts lists. Parts lists for the subassemblies are identified by the subassembly number in the DRAWING OR SPEC NO. column. Further parts list breakdown from this point is in the same manner.

Also included in the parts lists for each item is the quantity required (QTY. REQ'D.), EMR PART NUMBER, DESCRIPTION, VENDOR NAME, and VENDOR PART NUMBER. The listings in the VENDOR NAME column are abbreviations for the particular vendors. These abbreviations and complete vendor identification are contained in Table 6-3. Any part listed in the parts lists may be ordered directly from EMR or may be purchased from the original vendor.

6.3 RECOMMENDED SPARES

A list of the recommended spare parts for the 4530 is contained in Table 6-2. The recommended spares, as listed in this Table, are based on the following conditions:

a. Operating time -- 8 hours/day, 5 days/week (2080 hours/year).

b. Operating temperature -- $0^{\circ}C$ to $30^{\circ}C$.

c. User has capability to repair to the component level.

d. Failure rates are constant.

e. A 0.9 probability of being able to repair from the recommended complement for one year.

f. Equipment will be used as ground equipment (as opposed to vehicular or airborne).

The recommended spares table contains a PART DESCRIPTION column, an EMR STOCK NO. column, a VENDOR NAME column, a VENDOR PART NO. column, a TQ column which is the total quantity of the part in the unit, and an RS column which lists the number of recommended spares for the part. The listings in the VENDOR NAME column are abbreviations for the particular vendors. These abbreviations and complete vendor identification are described in Table 6-3.

6.4 PROVISIONING CONSIDERATIONS

The selection of an optimum spare parts complement involves a number of considerations known only to the user. These considerations include operating

time and cycles, operating environment, number of equipments to be spared and their locations with respect to one another, urgency of returning an equipment to service, troubleshooting, repair and test capability, stock of commonly used parts, etc.

Sparing considerations known to EMR include mean-time-between-failures for parts and assemblies under various operating environments, prices, relative ease of troubleshooting, repair, retest, etc.

Table 6-4 lists the type of information required in order for EMR to recommend an optimum spare parts complement for specific operating and logistic situations. If the information outlined in Table 6-4 is supplied to EMR, a recommended list will be furnished at no cost for each individual situation.

6.5 ORDERING INSTRUCTIONS

When ordering parts, complete description of each part as listed in DESCRIPTION column of parts list must accompany order. Also included, must be the EMR stock number and vendor's name and part number.

Table 6-1. Parts List Breakdown

NAME	NUMBER
MODEL 4530 VARIABLE CHART	14993
OSCILLATOR ASSEMBLY	PL-14991
OSCILLATOR ASSEMBLY	PL-14991-1
OSCILLATOR ASSEMBLY	PL-14991-2
OSCILLATOR ASSEMBLY	PL-14991-3
OSCILLATOR ASSEMBLY	PL-14991-4
CHASSIS ASSEMBLY	PL-14992
CHASSIS ASSEMBLY	PL-14992-1
FRONT PANEL ASSEMBLY	PL-14990
POWER SUPPLY REGULATOR CARD	PL-15799
CALIBRATE CARD	PL-15906
CALIBRATE CARD	PL-15906-1
CALIBRATE CARD	PL-15906-2
CALIBRATE CARD	PL-15906-3
CALIBRATE CARD	PL-15906-4
VCO CARD	PL-15796

REVISIONS				
SYM	DESCRIPTION	APPROVED	DATE	APPROVED
A	R/C ADDED [illegible]	[illegible]	[illegible]	[illegible]
B	ECO 45285 REVISED PAINT TO AGREE WITH SALES LITERATURE	6-8-72	[illegible]	[illegible]
C	R/C D/WG CONVERT 999-XX-XXXXX NOS	EDDT 5-14-79	5-14-79	[illegible]

9	± 8 VDC
8	230 V, 60 HZ
7	120 V, 400 HZ
0	220 V, 50 HZ

POWER SUPPLY DESIGN SEQ.

4	INTERNAL CAL. LOCAL CONTROL
3	INTERNAL CAL. REMOTE CONTROL
2	EXTERNAL CAL. REMOTE CONTROL
1	NO CALIBRATION

OSCILLATOR CONFIGURATION DESIGN SEQ.

MODEL 4530-XX-XXXX.XXX-XXX.XX-(% OR KHZ)-XXXX.XXX-XXX.XX-(% OR KHZ)-XX.XX-XX.XX-X

- XX: POWER SUPPLY DESIGN SEQ.
- XXXX.XXX: VCO #1 CENTER FREQ 300 KHZ TO 1.5 MHZ
- XXX.XX: VCO #1 DEVIATION ±2% TO ±40%
- (% OR KHZ): [illegible]
- XXXX.XXX: VCO #2 CENTER FREQ 300 HZ TO 1.5 MHZ
- XXX.XX: VCO #2 DEVIATION ±2% TO ±40%
- (% OR KHZ): [illegible]
- XX.XX: CALIBRATE VOLTAGE NEGATIVE
- XX.XX: CALIBRATE VOLTAGE POSITIVE
- X: PANEL COLOR / LETTERING

9	SPECIAL		
5	LT BEIGE 00052	BLACK	
4	GREY FED 26432	BLACK	
2	DARK GREEN 00049	WHITE	
1	LIGHT GREEN 00048	WHITE	
	PANEL COLOR	LETTERING	

	PARTS LIST	PART NO
[illegible]	PL-14991	184-89-00035
[illegible]	PL-14991-1	184-89-00046
[illegible]	PL-14991-2	84-89-00047
[illegible]	PL-14991-3	184-89-00048
[illegible]	PL-14991-4	184-89-00049
	PL-14991-5	84-89-00051
	PL-14991-6	84-89-00052
	PL-14991-7	84-89-00053

	999-01-01142 KNOB				999-01-01143 HANDLE				999-01-01144 TRIM			
	DWG NO	COLOR	PART NO	QTY	DWG NO	COLOR	PART NO	QTY	DWG NO	COLOR	PART NO	QTY
1	6076	DK. GREEN	148-99-00014	1	5860-1	DK. GREEN	128-99-00006	1	6011	POLISH	246-99-00011	1
2	6076-1	DK. GREEN	148-99-00022	1	5860-1	DK. GREEN	28-99-00006	1	6011	POLISH	246-99-00011	1
4	6076-2	BLACK	148-99-00023	1	5860-2	BLACK	128-99-00007	1	6011-1	BLACK	246-99-00012	1
5	6076-2	BLACK	148-99-00023	1	5860-2	BLACK	128-99-00007	1	6011-1	BLACK	246-99-00012	1

-2	-1	BASIC	DWG SIZE	PART NO.	DESCRIPTION	PART CLASS	MFG CODE	ITEM OR SYMBOL
REQ'D								

LIST OF MATERIALS

[illegible]	999-7	999-33-84
[illegible]	999-4	999-37
[illegible]	999-5	999-51
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
ASM NO	NEXT ASSY NO	[illegible]

UNLESS OTHERWISE SPECIFIED

DO NOT SCALE DRAWING

MATERIAL

TREATMENT OR FINISH

APPLICATION

DO NOT APPLY PART NO. PER LOCATE APPROPRIATE AS SHOWN

DRAWN BY [illegible] DATE

DESIGNER [illegible] 5-7-79

ENGINEER [illegible]

DESIGN ENGINEER

PROJECT ENGINEER [illegible]

APPROVED

APPROVED

SARASOTA DIVISION
ELECTRO-MECHANICAL RESEARCH, INC. • SARASOTA, FLORIDA

VARIABLE CHART, MODEL 4530

CODE IDENT NO	SIZE		REV
06141	D	14993	C
SCALE NONE	[illegible]	SHEET 1 OF 1	

14993

NOTICE TO PERSONS RECEIVING THIS DRAWING: THIS DRAWING CONTAINS INFORMATION PROPRIETARY TO FAIRCHILD WESTON SYSTEMS, INC. AND MAY NOT BE REPRODUCED WITHOUT WRITTEN PERMISSION FROM SUCH FIRM. BY ITS ISSUANCE, NEITHER THIS DRAWING NOR ANY REPRODUCTION THEREOF MAY BE USED TO MANUFACTURE ANYTHING SHOWN THEREIN WITHOUT PERMISSION IN WRITING FROM SUCH FIRM, OR SPECIFICALLY REFERRING TO THIS DRAWING

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PARTS LIST: 14991 MFR. NAME: FWSI PARENT STK. CONT. NO.: 184-89-00035

DESCRIPTION: OSC,ASSY UM: EA ECO NO.: RCD CHG ENG. REV.: MA

STD

ITEM NO.	COMPONENT STK. CONT. NO.	DESCRIPTION	QUANTITY	UM	MFR. NAME	MFR. PART/ASSY. NO.
001	042-89-00090	CHAS,ASSY	1	EA	FWSI	14992
002	191-89-00246	PANEL,ASSY	1	EA	FWSI	14990
003	999-01-01142	KNOB,*POA/VAR*	AR	EA	FWSI	14993
004	999-01-01143	HANDLE,*POA/VAR*	AR	EA	FWSI	14993
005	075-89-00065	COVER,ASSY	1	EA	FWSI	6650-1
006	205-89-00494	PWA,POWER SUPPLY REG	1	EA	FWSI	15799
007	205-89-00495	PWA,CALIBRATE CARD NO CAL	1	EA	FWSI	15906
008	205-89-00406	PWA,VCO	2	EA	FWSI	15796
010	127-98-00008	GROM,NYLATCH,BLK,.162 SH	1	EA	HARTWELL	HN-5G54-1
011	287-02-00016	NUT,HEX,4-40 SST	1	EA	QVL	NAS 671-C4
012	273-02-00046	WASHER,#4,FLAT,SS	1	EA	QVL	NAS620C4
013	273-02-00025	WASHER,#4,INT TOOTH	1	EA	PRCMT OPTION	MS35333-70
014	229-02-00072	SCREW,4-40X3/16 PAN HD	2	EA	PRCMT OPTION	MS51957-12
015	060-11-00001	CMPD,LOCKING,FINE THREAD	AR	EA	LOCTITE CORP	GRADE A /#271 RED
017	273-98-00011	WASHER,#4, FIBER	7	EA	H H SMITH	2161
018	229-02-00074	SCREW,4-40X5/16 PAN HD	6	EA	PRCMT OPTION	MS51957-14
019	140-99-00127	INS,PWA G-10 ADHESIVE	1	EA	FWSI	20163
020	140-99-00128	INS,PWA G-10 ADHESIVE	1	EA	FWSI	20164
021	196-99-00156	PLATE,NAME EQUIP IDENT	1	EA	FWSI	10663
022	412-99-00006	IDENT	AR	EA	FWSI	15719
024	140-99-00190	INSUL,SHIELD 3.975X12.200	1	EA	FWSI	21968-38
025	196-89-00108	PLATE,ASSY,LOGO, .36X1.00	1	EA	FWSI	20741-8
REF001	905-01-00372	SCHEMATIC	AR	EA	FWSI	16135
REF002	905-05-00138	VARIABLE CHART	AR	EA	FWSI	14993
REF003	905-07-00081	SPEC,PRODUCT	AR	EA	FWSI	15777
REF004	905-06-00038	SPEC,SETUP	AR	EA	FWSI	15778

(END OF LIST)

PARTS LIST: 14991-1 MFR. NAME: FWSI PARENT STK. CONT. NO.: 184-89-00046

DESCRIPTION: OSC,ASSY UM: EA ECO NO.: RCD CHG ENG. REV.: IA

4530-02

ITEM NO.	COMPONENT STK. CONT. NO.	DESCRIPTION	QUANTITY	UM	MFR. NAME	MFR. PART/ASSY. NO.
001	042-89-00090	CHAS,ASSY	1	EA	FWSI	14992
002	191-89-00246	PANEL,ASSY	1	EA	FWSI	14990
003	999-01-01142	KNOB,*POA/VAR*	AR	EA	FWSI	14993
004	999-01-01143	HANDLE,*POA/VAR*	AR	EA	FWSI	14993
005	075-89-00065	COVER,ASSY	1	EA	FWSI	6650-1
006	205-89-00494	PWA,POWER SUPPLY REG	1	EA	FWSI	15799
007	205-89-00496	PWA,CALIBRATE CARD EXT CA	1	EA	FWSI	15906-1
008	205-89-00406	PWA,VCO	2	EA	FWSI	15796
010	127-98-00008	GROM,NYLATCH,BLK,.162 SH	1	EA	HARTWELL	HN-5G54-1
011	287-02-00016	NUT,HEX,4-40 SST	1	EA	QVL	NAS 671-C4
012	273-02-00046	WASHER,#4,FLAT,SS	1	EA	QVL	NAS620C4
013	273-02-00025	WASHER,#4,INT TOOTH	1	EA	PRCMT OPTION	MS35333-70
014	229-02-00072	SCREW,4-40X3/16 PAN HD	2	EA	PRCMT OPTION	MS51957-12
015	060-11-00001	CMPD,LOCKING,FINE THREAD	AR	EA	LOCTITE CORP	GRADE A /#271 RED
017	273-98-00011	WASHER,#4, FIBER	7	EA	H H SMITH	2161
018	229-02-00074	SCREW,4-40X5/16 PAN HD	6	EA	PRCMT OPTION	MS51957-14
019	140-99-00127	INS,PWA G-10 ADHESIVE	1	EA	FWSI	20163
020	140-99-00128	INS,PWA G-10 ADHESIVE	1	EA	FWSI	20164
021	196-99-00156	PLATE,NAME EQUIP IDENT	1	EA	FWSI	10663
022	412-99-00006	IDENT	AR	EA	FWSI	15719
023	268-02-00039	TUBING,#22,EXTR TEF,CLEAR	.2	FT	PRCMT OPTION	MIL-I-22129
024	140-99-00190	INSUL,SHIELD 3.975X12.200	1	EA	FWSI	21968-38
025	196-89-00108	PLATE,ASSY,LOGO, .36X1.00	1	EA	FWSI	20741-8
CR001	088-10-41480	DIODE,SW,75V/5UA,4NS/10MA	1	EA	CODI/MML	1N4148
CR002	088-10-41480	DIODE,SW,75V/5UA,4NS/10MA	1	EA	CODI/MML	1N4148
REF001	905-01-00372	SCHEMATIC	AR	EA	FWSI	16135
REF002	905-05-00138	VARIABLE CHART	AR	EA	FWSI	14993
REF003	905-07-00081	SPEC,PRODUCT	AR	EA	FWSI	15777
REF004	905-06-00038	SPEC,SETUP	AR	EA	FWSI	15778

(END OF LIST)

EMR - TELEMETRY

PARTS LIST 14991-2 REV DATE REV LTR

LIST TITLE OSC,ASSY CHGE CONT NO. CODE IDENT SHT 1 OF
PART NO. 194-89-00047 ECO 06141 CKD BY

ITEM NO.	QTY REQD	E M R PART NUMBER	DRAWING OR SPEC NO.	DESCRIPTION	VENDOR NAME	VENDOR PART NUMBER
1	1	042-89-00110	14992-1	CHAS,ASSY	SPEC	14992-1
2	1	191-89-00246	14990	PANEL,ASSY	SPEC	14990
3	1	999-01-00001	14993	KNOB,POA VAR		
4	1	999-01-00002	14993	HANDLE,POA VAR		
5	1	075-89-00012	6650	COVER,ASSY	SPEC	6650
7	1	205-89-00497	15906-2	PWA,CALIBRATE CARD EXT CA	SPEC	15906-2
8	2	205-89-00406	15796	PWA,VCO	SPEC	15796
10	1	127-98-00008		GROM	HARTWELL	H559-4-1
11	2	287-02-00016		NUT,HEX,4-40 SST	QVL	NAS 671-C4
12	2	273-02-00046		WASHER,#4,FLAT,SS	QVL	NAS620C4
13	2	273-02-00036		WASHER,#4,SPLIT LOCK	QVL	MS35338-135
14	2	229-02-00072		SCREW,4-40X3/16 PAN HD	QVL	MS51957-12
15	A/R	060-11-00001		COMP, LOCTITE, GRADE D	AMER SEALANT	BY DESCRIPTION
16	6	229-02-00073		SCREW,4-40X1/4 PAN HD	QVL	MS51957-13
REF1	1	905-01-00372	16135	SCHEMATIC	SPEC	16135
REF2	1	905-05-00138	14993	VARIABLE CHART	SPEC	14993
REF3	1	905-07-00081	15777	SPEC,PRODUCT	SPEC	15777
REF4	1	905-06-00038	15778	SPEC,SETUP	SPEC	15778

FIRST USAGE MODEL 4530-92

PARTS LIST: 14991-3 MFR. NAME: FWSI PARENT STK. CONT. NO.: 184-89-00048

DESCRIPTION: OSC,ASSY UM: EA ECO NO.: RCD CHG ENG. REV.: HA

STD

ITEM NO.	COMPONENT STK. CONT. NO.	DESCRIPTION	QUANTITY	UM	MFR. NAME	MFR. PART/ASSY. NO.
001	042-89-00090	CHAS,ASSY	1	EA	FWSI	14992
002	191-89-00246	PANEL,ASSY	1	EA	FWSI	14990
003	999-01-01142	KNOB,*POA/VAR*	AR	EA	FWSI	14993
004	999-01-01143	HANDLE,*POA/VAR*	AR	EA	FWSI	14993
005	075-89-00065	COVER,ASSY	1	EA	FWSI	6650-1
006	205-89-00494	PWA,POWER SUPPLY REG	1	EA	FWSI	15799
007	205-89-00498	PWA,CALIBRATE CARD INT CA	1	EA	FWSI	15906-3
008	205-89-00406	PWA,VCO	2	EA	FWSI	15796
010	127-98-00008	GROM,NYLATCH,BLK,.162 SH	1	EA	HARTWELL	HN-5G54-1
011	287-02-00016	NUT,HEX,4-40 SST	1	EA	QVL	NAS 671-C4
012	273-02-00046	WASHER,#4,FLAT,SS	1	EA	QVL	NAS620C4
013	273-02-00025	WASHER,#4,INT TOOTH	1	EA	PRCMT OPTION	MS35333-70
014	229-02-00072	SCREW,4-40X3/16 PAN HD	2	EA	PRCMT OPTION	MS51957-12
015	060-11-00001	CMPD,LOCKING,FINE THREAD	AR	EA	LOCTITE CORP	GRADE A /#271 RED
017	273-98-00011	WASHER,#4, FIBER	7	EA	H H SMITH	2161
018	229-02-00074	SCREW,4-40X5/16 PAN HD	6	EA	PRCMT OPTION	MS51957-14
019	140-99-00127	INS,PWA G-10 ADHESIVE	1	EA	FWSI	20163
020	140-99-00128	INS,PWA G-10 ADHESIVE	1	EA	FWSI	20164
021	196-99-00156	PLATE,NAME EQUIP IDENT	1	EA	FWSI	10663
022	412-99-00006	IDENT	AR	EA	FWSI	15719
024	140-99-00190	INSUL,SHIELD 3.975X12.200	1	EA	FWSI	21968-38
025	196-89-00108	PLATE,ASSY,LOGO, .36X1.00	1	EA	FWSI	20741-8
REF001	905-01-00372	SCHEMATIC	AR	EA	FWSI	16135
REF002	905-05-00138	VARIABLE CHART	AR	EA	FWSI	14993
REF003	905-07-00081	SPEC,PRODUCT	AR	EA	FWSI	15777
REF004	905-06-00038	SPEC,SETUP	AR	EA	FWSI	15778

(END OF LIST)

EMR - TELEMETRY

PARTS LIST 14991-4 REV DATE REV LTR

LIST TITLE USC,ASSY CHGE CONT NO. CODE IDENT SHT 1 OF
PART NO. 184-89-00049 ECO 06141 CKD BY

ITEM NO.	QTY REQD	EMR PART NUMBER	DRAWING OR SPEC NO.	DESCRIPTION	VENDOR NAME	VENDOR PART NUMBER
1	1	042-89-00118	14992-1	CHAS,ASSY	SPEC	14992-1
2	1	191-89-00246	14990	PANEL,ASSY	SPEC	14990
3	1	999-01-00001	14993	KNOB,POA VAR		
4	1	999-01-00002	14993	HANDLE,POA VAR		
5	1	075-89-00012	6650	COVER,ASSY	SPEC	6650
7	1	205-89-00499	15906-4	PWA,CALIBRATE CARD INT CA	SPEC	15906-4
8	2	205-89-00406	15796	PWA,VCO	SPEC	15796
10	1	127-98-00008		GROM	HARTWELL	H559-4-1
11	2	287-02-00016		NUT,HEX,4-40 SST	QVL	NAS 671-C4
12	2	273-02-00046		WASHER,#4,FLAT,SS	QVL	NAS620C4
13	2	273-02-00036		WASHER,#4,SPLIT LOCK	QVL	MS35338-135
14	2	229-02-00072		SCREW,4-40X3/16 PAN HD	QVL	MS51957-12
15	A/R	060-11-00001		COMP, LOCTITE, GRADE D	AMER SEALANT	BY DESCRIPTION
16	6	229-02-00073		SCREW,4-40X1/4 PAN HD	QVL	MS51957-13
REF1	1	905-01-00372	16135	SCHEMATIC	SPEC	16135
REF2	1	905-05-00138	14993	VARIABLE CHART	SPEC	14993
REF3	1	905-07-00081	15777	SPEC,PRODUCT	SPEC	15777
REF4	1	905-06-00038	15778	SPEC,SETUP	SPEC	15778

FIRST USAGE MODEL 4530-93694

PARTS LIST: 14992 MFR. NAME: FWSI PARENT STK. CONT. NO.: 042-89-00090

DESCRIPTION: CHAS,ASSY UM: EA ECO NO.: RCD CHG ENG. REV.: *N

4530-02

ITEM NO.	COMPONENT STK. CONT. NO.	DESCRIPTION	QUANTITY	UM	MFR. NAME	MFR. PART/ASSY. NO.
001	042-89-00092	CHAS,ASSY,WELDMENT	1	EA	FWSI	15723
002	205-89-00500	PWA,INTERCONNECT CARD	1	EA	FWSI	15908
003	134-98-00023	HOLDER,FUSE 5A FR PNL MT	1	EA	LITTELFUSE	281006
004	120-98-00038	FUSE,MICRO,1 AMP 125V	1	EA	LITTELFUSE	273001
005	063-98-00042	CONN,PLUG,16PIN,R&P	1	EA	AMPHENOL	26-159-16
006	262-99-00067	XFMR,PRI105-132V,60-440HZ	1	EA	FWSI	15893
007	229-02-00105	SCREW,8-32X3/4 PAN HD	4	EA	PRCMT OPTION	MS51957-47
008	229-02-00073	SCREW,4-40X1/4 PAN HD	10	EA	PRCMT OPTION	MS51957-13
009	273-98-00035	WASHER,#8,FIBRE .175ID	17	EA	SEASTROM	5602-79-062
012	287-02-00016	NUT,HEX,4-40 SST	2	EA	QVL	NAS 671-C4
013	273-02-00025	WASHER,#4,INT TOOTH	2	EA	PRCMT OPTION	MS35333-70
016	229-02-00186	SCREW,4-40X5/16,FLT HD	4	EA	PRCMT OPTION	MS51959-14
017	273-02-00046	WASHER,#4,FLAT,SS	4	EA	QVL	NAS620C4
018	287-02-00016	NUT,HEX,4-40 SST	4	EA	QVL	NAS 671-C4
019	268-98-00013	TUBING,.750ID,SHRINK	.5	FT	ALPHA/MML	FIT-105-3/4*BLACK*
022	273-02-00021	WASHER,#8,EXT TOOTH	4	EA	PRCMT OPTION	MS35335-59
023	250-89-00020	SWITCH ROT 2 P/2-5 POS	1	EA	FWSI	8009-1
024	255-98-00048	TERM,LUG,SOLDER,#4 HOLE	1	EA	BIRNBACH	193
025	140-99-00126	INS,CHASSIS G-10	1	EA	FWSI	20162
026	060-11-00013	CMPD,ADH,GENERAL PURPOSE	AR	EA	GOODYEAR	PLIOBOND
027	268-02-00039	TUBING,#22,EXTR TEF,CLEAR	.5	FT	PRCMT OPTION	MIL-I-22129
028	276-99-00008	WIRE,#22,BUSS,SOLID	.5	FT	FWSI	619-22
Q 001	263-10-49220	XSTR,PWR NPN, 30W, 3A	1	EA	FCH/MML	2N4922
Q 002	263-10-49190	XSTR,PNP,SW AMPL 60V,1A	1	EA	FCH/MML	2N4919
Q 003	263-10-49220	XSTR,PWR NPN, 30W, 3A	1	EA	FCH/MML	2N4922
Q 004	263-10-49190	XSTR,PNP,SW AMPL 60V,1A	1	EA	FCH/MML	2N4919

(END OF LIST)

EMR - TELEMETRY

PARTS LIST 14992-1 REV DATE REV LTR

LIST TITLE CHAS,ASSY CHGE CONT NO. CODE IDENT SHT 1 OF
PART NO. 042-89-00118 ECO 06141 CKD BY

ITEM NO.	QTY REQD	E M R PART NUMBER	DRAWING OR SPEC NO.	DESCRIPTION	VENDOR NAME	VENDOR PART NUMBER
1	1	042-89-00092	15723	CHAS,ASSY,WELDMENT	SPEC	15723
2	1	205-89-00500	15908	PWA,INTERCONNECT CARD	SPEC	15908
3	1	134-98-00016		HOLDER,FUSE	LITTLEFUSE	281002
4	1	120-98-00038	273001	FUSE,MICRO,1 AMP 125V	LITTELFUSE	273001
5	1	063-98-00042		CONN,PLUG,16PIN,R&P	AMPHENOL	26-159-16
8	10	229-02-00073		SCREW,4-40X1/4 PAN HD	QVL	MS51957-13
9	6	273-98-00036		WASHER,#8,FIBRE .188ID	SEASTROM	5602-82-093
10	6	273-98-00035		WASHER,#8,FIBRE .175ID	SEASTROM	5602-79-062
12	2	287-02-00016		NUT,HEX,4-40 SST	QVL	NAS 671-C4
13	2	273-02-00025		WASHER,#4,INT TOOTH	QVL	MS35333-70
16	4	229-02-00186		SCREW,4-40X5/16,FLT HD	QVL	MS51959-14
17	4	273-02-00046		WASHER,#4,FLAT,SS	QVL	NAS620C4
18	4	287-02-00016		NUT,HEX,4-40 SST	QVL	NAS 671-C4
19	A/R	268-98-00013		TUBING,3/4,SHRINK,BLK	ALPHLEX	PVC-105
23	1	250-98-00045		SWITCH,ROT.,2P,2-5POS,NS	ALCO	MRA-2-5S
24	1	255-98-00048		TERM, SOLDER LUG, #4	BIRNBACK	193
Q1	1	263-10-49220		XSTR,NPN,SW AMPL 60V,1A	JEDEC	2N4922
Q2	1	263-10-49190		XSTR,PNP,SW AMPL 60V,1A	JEDEC	2N4919
Q3	1	263-10-49220		XSTR,NPN,SW AMPL 60V,1A	JEDEC	2N4922
Q4	1	263-10-49190		XSTR,PNP,SW AMPL 60V,1A	JEDEC	2N4919

FIRST USAGE MODEL 4530-92,93&94

EMR - TELEMETRY

PARTS LIST 14990 REV DATE REV LTR

LIST TITLE PANEL,ASSY CHGE CONT NO. CODE IDENT SHT 1 OF
PART NO. 191-89-00246 ECO 06141 CKD BY

ITEM NO.	QTY REQD	E M R PART NUMBER	DRAWING OR SPEC NO.	DESCRIPTION	VENDOR NAME	VENDOR PART NUMBER
1	1	191-89-00247	15717	PANEL,ASSY	SPEC	15717
2	1	999-04-00003	14993	STRIP,POA VAR		
3	2	412-99-00007	15718	IDENT,RET	SPEC	15718
4	1	016-99-00041	6012	BRKT, LOCATING	SPEC	6012
5	4	143-98-00006		JACK,TEST,WHITE	SEALECTRO	SKT-8-WHITE
6	2	229-02-00217		SCREW,0X3/16,RND HD	QVL	MS21318-8
7	7	229-02-00216		SCREW,00X3/16,RND HD	QVL	MS21318-2
REF1	1	905-10-00188	MYL-14990	ARTWORK,FRONT PANEL	SPEC	MYL-14990
REF2	1	905-05-00138	14993	VARIABLE CHART	SPEC	14993

FIRST USAGE MODEL 4530

PARTS LIST: 15799 MFR. NAME: FWSI PARENT STK. CONT. NO.: 205-89-00494

DESCRIPTION: PWA,POWER SUPPLY REG UM: EA ECO NO.: RCD CHG ENG. REV.: FA
4530-02

ITEM NO.	COMPONENT STK. CONT. NO.	DESCRIPTION	QUANTITY	UM	MFR. NAME	MFR. PART/ASSY. NO.
001	204-89-00191	PWB, REGULATOR	1	EA	FWSI	15798
002	065-98-00012	CONT,PCB MOUNT RECEPTACLE	18	EA	AMP	85861-4
004	268-02-00026	TUBING,#18,EXTR TEF,CLEAR	.5	FT	PRCMT OPTION	MIL-I-22129
005	140-99-00151	INSUL,SPACER .18X1.0X.12T	1	EA	FWSI	21968-12
006	060-11-00020	CMPD,EPOXY,GENL PURPOSE	AR	EA	E&C	ECCOBOND 26
C 001	354-59-25005	CAP., 250MF -10&75% 40V	1	EA	SPR/MML	39D257G040GE4
C 002	336-14-10003	CAP. 1.0MF 10% 35V	1	EA	FWSI	601
C 003	354-59-25005	CAP., 250MF -10&75% 40V	1	EA	SPR/MML	39D257G040GE4
C 004	336-14-10003	CAP. 1.0MF 10% 35V	1	EA	FWSI	601
C 005	354-59-25005	CAP., 250MF -10&75% 40V	1	EA	SPR/MML	39D257G040GE4
C 006	336-14-10003	CAP. 1.0MF 10% 35V	1	EA	FWSI	601
C 007	354-59-25005	CAP., 250MF -10&75% 40V	1	EA	SPR/MML	39D257G040GE4
C 008	336-14-10003	CAP. 1.0MF 10% 35V	1	EA	FWSI	601
CR001	214-98-00003	RECT,BRDG FW, 1.0A,100V	1	EA	MOT	MDA920A-3
CR002	088-10-41480	DIODE,SW,75V/5UA,4NS/10MA	1	EA	CODI/MML	1N4148
CR003	088-10-09360	DIODE,REF,9V/7.5MA,.005 %	1	EA	MOT/MML	1N936/1N936A/1N936B
CR004	088-10-40040	DIODE,RECT 400V,1A IR.01	1	EA	CODI/MML	1N4004
CR005	088-10-41480	DIODE,SW,75V/5UA,4NS/10MA	1	EA	CODI/MML	1N4148
CR006	088-10-09360	DIODE,REF,9V/7.5MA,.005 %	1	EA	MOT/MML	1N936/1N936A/1N936B
CR007	088-10-40040	DIODE,RECT 400V,1A IR.01	1	EA	CODI/MML	1N4004
CR008	214-98-00003	RECT,BRDG FW, 1.0A,100V	1	EA	MOT	MDA920A-3
CR009	088-10-41480	DIODE,SW,75V/5UA,4NS/10MA	1	EA	CODI/MML	1N4148
CR010	088-10-09360	DIODE,REF,9V/7.5MA,.005 %	1	EA	MOT/MML	1N936/1N936A/1N936B
CR011	088-10-40040	DIODE,RECT 400V,1A IR.01	1	EA	CODI/MML	1N4004
CR012	088-10-41480	DIODE,SW,75V/5UA,4NS/10MA	1	EA	CODI/MML	1N4148
CR013	088-10-09360	DIODE,REF,9V/7.5MA,.005 %	1	EA	MOT/MML	1N936/1N936A/1N936B
CR014	088-10-40040	DIODE,RECT 400V,1A IR.01	1	EA	CODI/MML	1N4004
Q 001	263-97-00093	XSTR,PNP,SWITCH/AMPL,50V	1	EA	FCH/MML	2N3251
Q 003	263-10-39470	XSTR,NPN 40V SW-AMPL,HFE	1	EA	FCH/MML	2N3947
Q 004	263-10-39470	XSTR.NPN 40V SW-AMPL,HFE	1	EA	FCH/MML	2N3947
Q 005	263-97-00093	XSTR,PNP,SWITCH/AMPL,50V	1	EA	FCH/MML	2N3251
Q 006	263-97-00093	XSTR,PNP,SWITCH/AMPL,50V	1	EA	FCH/MML	2N3251
Q 007	263-10-39470	XSTR,NPN 40V SW-AMPL,HFE	1	EA	FCH/MML	2N3947
Q 009	263-97-00093	XSTR,PNP,SWITCH/AMPL,50V	1	EA	FCH/MML	2N3251
Q 011	263-10-39470	XSTR,NPN 40V SW-AMPL,HFE	1	EA	FCH/MML	2N3947
Q 012	263-10-39470	XSTR,NPN 40V SW-AMPL,HFE	1	EA	FCH/MML	2N3947
Q 013	263-97-00093	XSTR,PNP,SWITCH/AMPL,50V	1	EA	FCH/MML	2N3251
Q 014	263-97-00093	XSTR,PNP,SWITCH/AMPL,50V	1	EA	FCH/MML	2N3251
Q 015	263-10-39470	XSTR,NPN 40V SW-AMPL,HFE	1	EA	FCH/MML	2N3947
R 001	616-02-10001	RES,10K 5% 1/4W	1	EA	ALLEN BRAD	RC07GF103J
R 002	616-02-10001	RES,10K 5% 1/4W	1	EA	ALLEN BRAD	RC07GF103J
R 003	616-02-15000	RES,1.5K 5% 1/4W	1	EA	ALLEN BRAD	RC07GF152J
R 004	616-02-12004	RES,12 MEG 5% 1/4W	1	EA	ALLEN BRAD	RC07GF126J
R 005	608-09-90900	RES. 9.09K 1% 1/10W	1	EA	FWSI	624
R 006	616-02-20000	RES,2K 5% 1/4W	1	EA	ALLEN BRAD	RC07GF202J
R 007	616-02-91000	RES,9.1K 5% 1/4W	1	EA	ALLEN BRAD	RC07GF912J
R 008	608-09-00000	RES,*TVAR* 1%,1/10W	AR	EA	FWSI	624
R 009	616-02-20000	RES,2K 5% 1/4W	1	EA	ALLEN BRAD	RC07GF202J

(CONTINUED)

PARTS LIST: 15799 MFR. NAME: FWSI PARENT STK. CONT. NO.: 205-89-00494

DESCRIPTION: PWA,POWER SUPPLY REG UM: EA ECO NO.: RCD CHG ENG. REV.: FA
4530-02

ITEM NO.	COMPONENT STK. CONT. NO.	DESCRIPTION	QUANTITY	UM	MFR. NAME	MFR. PART/ASSY. NO.
R 010	616-02-91000	RES,9.1K 5% 1/4W	1	EA	ALLEN BRAD	RC07GF912J
R 011	608-09-00000	RES,*TVAR* 1%,1/10W	AR	EA	FWSI	624
R 012	616-02-10001	RES,10K 5% 1/4W	1	EA	ALLEN BRAD	RC07GF103J
R 013	616-02-10001	RES,10K 5% 1/4W	1	EA	ALLEN BRAD	RC07GF103J
R 014	616-02-15000	RES,1.5K 5% 1/4W	1	EA	ALLEN BRAD	RC07GF152J
R 015	616-02-12004	RES,12 MEG 5% 1/4W	1	EA	ALLEN BRAD	RC07GF126J
R 016	608-09-90900	RES. 9.09K 1% 1/10W	1	EA	FWSI	624
R 017	616-02-10001	RES,10K 5% 1/4W	1	EA	ALLEN BRAD	RC07GF103J
R 018	616-02-10001	RES,10K 5% 1/4W	1	EA	ALLEN BRAD	RC07GF103J
R 019	616-02-15000	RES,1.5K 5% 1/4W	1	EA	ALLEN BRAD	RC07GF152J
R 020	616-02-12004	RES,12 MEG 5% 1/4W	1	EA	ALLEN BRAD	RC07GF126J
R 021	608-09-90900	RES. 9.09K 1% 1/10W	1	EA	FWSI	624
R 022	616-02-20000	RES,2K 5% 1/4W	1	EA	ALLEN BRAD	RC07GF202J
R 023	616-02-91000	RES,9.1K 5% 1/4W	1	EA	ALLEN BRAD	RC07GF912J
R 024	608-09-00000	RES,*TVAR* 1%,1/10W	AR	EA	FWSI	624
R 025	616-02-20000	RES,2K 5% 1/4W	1	EA	ALLEN BRAD	RC07GF202J
R 026	616-02-91000	RES,9.1K 5% 1/4W	1	EA	ALLEN BRAD	RC07GF912J
R 027	608-09-00000	RES,*TVAR* 1%,1/10W	AR	EA	FWSI	624
R 028	616-02-10001	RES,10K 5% 1/4W	1	EA	ALLEN BRAD	RC07GF103J
R 029	616-02-10001	RES,10K 5% 1/4W	1	EA	ALLEN BRAD	RC07GF103J
R 030	616-02-15000	RES,1.5K 5% 1/4W	1	EA	ALLEN BRAD	RC07GF152J
R 031	616-02-12004	RES,12 MEG 5% 1/4W	1	EA	ALLEN BRAD	RC07GF126J
R 032	608-09-90900	RES. 9.09K 1% 1/10W	1	EA	FWSI	624
R 033	616-02-00000	RES,*TVAR*	AR	EA	FWSI	00000
R 034	616-02-00000	RES,*TVAR*	AR	EA	FWSI	00000
R 035	616-02-00000	RES,*TVAR*	AR	EA	FWSI	00000
R 036	616-02-00000	RES,*TVAR*	AR	EA	FWSI	00000
REF001	905-01-00375	SCHEMATIC	AR	EA	FWSI	15797
REF002	905-04-00002	SPEC,COMPONENT SPACING	AR	EA	FWSI	9500-1
REF003	204-89-00191	PWB, REGULATOR	AR	EA	FWSI	15798

(END OF LIST)

DATE 12/09/85 BMG210 FAIRCHILD WESTON INC. CODE IDENT. 06141 PAGE 1

PARTS LIST: 15906 MFR. NAME: FWSI PARENT STK. CONT. NO.: 205-89-00495

DESCRIPTION: PWA,CALIBRATE CARD NO CAL STD UM: EA ECO NO.: RCD CHG ENG. REV.: *F

ITEM NO.	COMPONENT STK. CONT. NO.	DESCRIPTION	QUANTITY	UM	MFR. NAME	MFR. PART/ASSY. NO.
001	204-99-00395	PWB,CALIBRATE	1	EA	FWSI	15905
002	065-98-00012	CONT,PCB MOUNT RECEPTACLE	26	EA	AMP	85861-4
003	276-99-00008	WIRE,#22,BUSS,SOLID	1	FT	FWSI	619-22
004	268-02-00039	TUBING,#22,EXTR TEF,CLEAR	1	FT	PRCMT OPTION	MIL-I-22129
C 001	337-13-15004	CAP., 15MF 10% 20V	1	EA	FWSI	601
C 002	337-13-15004	CAP., 15MF 10% 20V	1	EA	FWSI	601
R 001	616-02-03909	RES,39 OHM 5% 1/4W	1	EA	ALLEN BRAD	RC07GF390J
R 002	616-02-18009	RES,180 OHM 5% 1/4W	1	EA	ALLEN BRAD	RC07GF181J
R 003	616-02-10000	RES,1K 5% 1/4W	1	EA	ALLEN BRAD	RC07GF102J
R 014	616-02-10000	RES,1K 5% 1/4W	1	EA	ALLEN BRAD	RC07GF102J
R 015	616-02-03909	RES,39 OHM 5% 1/4W	1	EA	ALLEN BRAD	RC07GF390J
R 016	616-02-18009	RES,180 OHM 5% 1/4W	1	EA	ALLEN BRAD	RC07GF181J
T 001	262-89-00064	XFMR,ASSY,OUTPUT	1	EA	FWSI	15802-6
T 002	262-89-00064	XFMR,ASSY,OUTPUT	1	EA	FWSI	15802-6
REF001	905-01-00376	SCHEMATIC	AR	EA	FWSI	15800
REF002	905-04-00002	SPEC,COMPONENT SPACING	AR	EA	FWSI	9500-1

(END OF LIST)

PARTS LIST: 15906-1 MFR. NAME: FWSI PARENT STK. CONT. NO.: 205-89-00496

DESCRIPTION: PWA,CALIBRATE CARD EXT CA 4530-82 UM: EA ECO NO.: RCD CHG ENG. REV.: *F

ITEM NO.	COMPONENT STK. CONT. NO.	DESCRIPTION	QUANTITY	UM	MFR. NAME	MFR. PART/ASSY. NO.
001	204-99-00395	PWB,CALIBRATE	1	EA	FWSI	15905
002	065-98-00012	CONT,PCB MOUNT RECEPTACLE	26	EA	AMP	85861-4
003	276-99-00008	WIRE,#22,BUSS,SOLID	1	FT	FWSI	619-22
004	268-02-00039	TUBING,#22,EXTR TEF,CLEAR	1	FT	PRCMT OPTION	MIL-I-22129
C 001	337-13-15004	CAP., 15MF 10% 20V	1	EA	FWSI	601
C 002	337-13-15004	CAP., 15MF 10% 20V	1	EA	FWSI	601
CR001	088-10-41480	DIODE,SW,75V/5UA,4NS/10MA	1	EA	CODI/MML	1N4148
K 001	219-99-00019	RELAY,2 FORM C,GOLD CONT	1	EA	FWSI/MML	28531-12
K 003	219-99-00019	RELAY,2 FORM C,GOLD CONT	1	EA	FWSI/MML	28531-12
R 001	616-02-03909	RES,39 OHM 5% 1/4W	1	EA	ALLEN BRAD	RC07GF390J
R 002	616-02-18009	RES,180 OHM 5% 1/4W	1	EA	ALLEN BRAD	RC07GF181J
R 003	616-02-10000	RES,1K 5% 1/4W	1	EA	ALLEN BRAD	RC07GF102J
R 014	616-02-10000	RES,1K 5% 1/4W	1	EA	ALLEN BRAD	RC07GF102J
R 015	616-02-03909	RES,39 OHM 5% 1/4W	1	EA	ALLEN BRAD	RC07GF390J
R 016	616-02-18009	RES,180 OHM 5% 1/4W	1	EA	ALLEN BRAD	RC07GF181J
T 001	262-89-00064	XFMR,ASSY,OUTPUT	1	EA	FWSI	15802-6
T 002	262-89-00064	XFMR,ASSY,OUTPUT	1	EA	FWSI	15802-6
REF001	905-01-00378	SCHEMATIC	AR	EA	FWSI	16131
REF002	905-04-00002	SPEC,COMPONENT SPACING	AR	EA	FWSI	9500-1

(END OF LIST)

EMR - TELEMETRY

PARTS LIST 15906-2 REV DATE 08/19/68 REV LTR B

LIST TITLE PWA,CALIBRATE CARD EXT CA CHGE CONT NO. CODE IDENT SHT 1 OF
PART NO. 205-89-00497 ECO 34181 06141 CKD BY

ITEM NO.	QTY REQD	E M R PART NUMBER	DRAWING OR SPEC NO.	DESCRIPTION	VENDOR NAME	VENDOR PART NUMBER
1	1	204-99-00395	15905	PWB,CALIBRATE	SPEC	15905
2	26	065-98-00012		CONT,SOCKET	AMP	85861-4
3	A/R	276-99-00008	619-22	WIRE,#22,BUSS,SOLID	SPEC	619-22
4	A/R	268-02-00039		TUBING,#22,EXTR TEF,CLEAR	QVL	MIL-I-22129
CR1	1	088-10-41480		DIODE	JEDEC	1N4148
K1	1	219-98-00046		RELAY,2 FORM C CONTACTS	HATHAWAY INS	GP-2C-26-FCD
K3	1	219-98-00046		RELAY,2 FORM C CONTACTS	HATHAWAY INS	GP-2C-26-FCD
R1	1	616-02-03909		RES,39 OHM 5% 1/4W	ALLEN BRAD	RC07GF390J
R2	1	616-02-18009		RES,180 OHM 5% 1/4W	ALLEN BRAD	RC07GF181J
R3	1	616-02-10000		RES,1K 5% 1/4W	ALLEN BRAD	RC07GF102J
R14	1	616-02-10000		RES,1K 5% 1/4W	ALLEN BRAD	RC07GF102J
R15	1	616-02-03909		RES,39 OHM 5% 1/4W	ALLEN BRAD	RC07GF390J
R16	1	616-02-18009		RES,180 OHM 5% 1/4W	ALLEN BRAD	RC07GF181J
REF1	1	905-01-00378	16131	SCHEMATIC	SPEC	16131
REF2	1	905-04-00002	9500-1	SPEC,COMPONENT SPACING	SPEC	9500-1

FIRST USAGE MODEL 4530

PARTS LIST: 15906-3 MFR. NAME: FWSI PARENT STK. CONT. NO.: 205-89-00498

DESCRIPTION: PWA,CALIBRATE CARD INT CAL STD UM: EA ECO NO.: RCD CHG ENG. REV.: EA

ITEM NO.	COMPONENT STK. CONT. NO.	DESCRIPTION	QUANTITY	UM	MFR. NAME	MFR. PART/ASSY. NO.
001	204-99-00395	PWB,CALIBRATE	1	EA	FWSI	15905
002	065-98-00012	CONT,PCB MOUNT RECEPTACLE	26	EA	AMP	85861-4
003	276-99-00008	WIRE,#22,BUSS,SOLID	1	FT	FWSI	619-22
004	268-02-00039	TUBING,#22,EXTR TEF,CLEAR	1	FT	PRCMT OPTION	MIL-I-22129
C 001	337-13-15004	CAP., 15MF 10% 20V	1	EA	FWSI	601
C 002	337-13-15004	CAP., 15MF 10% 20V	1	EA	FWSI	601
CR001	088-10-41480	DIODE,SW,75V/5UA,4NS/10MA	1	EA	CODI/MML	1N4148
CR002	088-10-41480	DIODE,SW,75V/5UA,4NS/10MA	1	EA	CODI/MML	1N4148
K 001	219-99-00019	RELAY,2 FORM C,GOLD CONT	1	EA	FWSI/MML	28531-12
K 002	219-99-00018	RELAY,2 FORM A,RHOD CONT	1	EA	FWSI/MML	28531-11
K 003	219-99-00018	RELAY,2 FORM A,RHOD CONT	1	EA	FWSI/MML	28531-11
R 001	616-02-03909	RES,39 OHM 5% 1/4W	1	EA	ALLEN BRAD	RC07GF390J
R 002	616-02-18009	RES,180 OHM 5% 1/4W	1	EA	ALLEN BRAD	RC07GF181J
R 003	616-02-10000	RES,1K 5% 1/4W	1	EA	ALLEN BRAD	RC07GF102J
R 004	999-01-01237	RES,*VOLT./VAR*	AR	EA	FWSI	16246
R 005	201-98-00295	POT,TRMR,1.0 K 10% .75W	1	EA	BECK/MML	89PR1K
R 006	999-01-01237	RES,*VOLT./VAR*	AR	EA	FWSI	16246
R 007	201-98-00295	POT,TRMR,1.0 K 10% .75W	1	EA	BECK/MML	89PR1K
R 008	999-01-01236	RES,*VOLT./VAR*	AR	EA	FWSI	16246
R 009	999-01-01236	RES,*VOLT./VAR*	AR	EA	FWSI	16246
R 010	999-01-01237	RES,*VOLT./VAR*	AR	EA	FWSI	16246
R 011	201-98-00295	POT,TRMR,1.0 K 10% .75W	1	EA	BECK/MML	89PR1K
R 012	999-01-01237	RES,*VOLT./VAR*	AR	EA	FWSI	16246
R 013	201-98-00295	POT,TRMR,1.0 K 10% .75W	1	EA	BECK/MML	89PR1K
R 014	616-02-10000	RES,1K 5% 1/4W	1	EA	ALLEN BRAD	RC07GF102J
R 015	616-02-03909	RES,39 OHM 5% 1/4W	1	EA	ALLEN BRAD	RC07GF390J
R 016	616-02-18009	RES,180 OHM 5% 1/4W	1	EA	ALLEN BRAD	RC07GF181J
T 001	262-89-00064	XFMR,ASSY,OUTPUT	1	EA	FWSI	15802-6
T 002	262-89-00064	XFMR,ASSY,OUTPUT	1	EA	FWSI	15802-6
REF001	905-01-00377	SCHEMATIC	AR	EA	FWSI	16130
REF002	905-04-00002	SPEC,COMPONENT SPACING	AR	EA	FWSI	9500-1
REF003	905-05-00269	VARIABLE CHART 4530-X3&X4	AR	EA	FWSI	16246

(END OF LIST)

EMR - TELEMETRY

PARTS LIST 15906-4 REV DATE 08/19/68 REV LTR B

LIST TITLE PWA,CALIBRATE CARD INT CA CHGE CONT NO. CODE IDENT SHT 1 OF
PART NO. 205-89-00499 ECO 34181 06141 CKD BY

ITEM NO.	QTY REQD	E M R PART NUMBER	DRAWING OR SPEC NO.	DESCRIPTION	VENDOR NAME	VENDOR PART NUMBER
1	1	204-99-00395	15905	PWB,CALIBRATE	SPEC	15905
2	26	065-98-00012		CONT,SOCKET	AMP	85861-4
3	A/R	276-99-00008	619-22	WIRE,#22,BUSS,SOLID	SPEC	619-22
4	A/R	260-02-00039		TUBING,#22,EXTR TEF,CLEAR	QVL	MIL-I-22129
CR1	1	088-10-41480		DIODE	JEDEC	1N4148
CR2	1	088-10-41480		DIODE	JEDEC	1N4148
K1	1	219-98-00046		RELAY,2 FORM C CONTACTS	HATHAWAY INS	GP-2C-26-FCD
K2	1	219-98-00045		RELAY,2 FORM A CONTACTS	HATHAWAY INS	GP-2A-26-P
K3	1	219-98-00045		RELAY,2 FORM A CONTACTS	HATHAWAY INS	GP-2A-26-P
R1	1	616-02-03909		RES,39 OHM 5% 1/4W	ALLEN BRAD	RC07GF390J
R2	1	616-02-18009		RES,180 OHM 5% 1/4W	ALLEN BRAD	RC07GF181J
R3	1	616-02-10000		RES,1K 5% 1/4W	ALLEN BRAD	RC07GF102J
R4	1	999-01-00002	16246	RES, *VOLT./VAR*		
R5	1	201-98-00015		POT., 1K 10% 1W	AMPH. BORG	2600P-102 BS1066
R6	1	999-01-00002	16246	RES, *VOLT./VAR*		
R7	1	201-98-00015		POT., 1K 10% 1W	AMPH. BORG	2600P-102 BS1066
R8	1	999-01-00001	16246	RES, *VOLT./VAR*		
R9	1	999-01-00001	16246	RES, *VOLT./VAR*		
R10	1	999-01-00002	16246	RES, *VOLT./VAR*		
R11	1	201-98-00015		POT., 1K 10% 1W	AMPH. BORG	2600P-102 BS1066
R12	1	999-01-00002	16246	RES, *VOLT./VAR*		
R13	1	201-98-00015		POT., 1K 10% 1W	AMPH. BORG	2600P-102 BS1066

FIRST USAGE MODEL 4530

ITEM NO.	QTY REQD	E M R PART NUMBER	DRAWING OR SPEC NO.	DESCRIPTION	VENDOR NAME	VENDOR PART NUMBER
R14	1	616-02-10000		RES,1K 5% 1/4W	ALLEN BRAD	RC07GF102J
R15	1	616-02-03909		RES,39 OHM 5% 1/4W	ALLEN BRAD	RC07GF390J
R16	1	616-02-18009		RES,180 OHM 5% 1/4W	ALLEN BRAD	RC07GF181J
REF1	1	905-01-00377	16130	SCHEMATIC	SPEC	16130
REF2	2	905-04-00002	9500-1	SPEC,COMPONENT SPACING	SPEC	9500-1

FIRST USAGE MODEL 4530

PARTS LIST: 15796 MFR. NAME: FWSI PARENT STK. CONT. NO.: 205-89-00406

DESCRIPTION: PWA,VCO UM: EA ECO NO.: 0401005 ENG. REV.: PB

4530-82

ITEM NO.	COMPONENT STK. CONT. NO.	DESCRIPTION	QUANTITY	UM	MFR. NAME	MFR. PART/ASSY. NO.
001	204-89-00190	PWB,VCO	1	EA	FWSI	15795
002	239-99-00058	SPACER	1	EA	FWSI	15733
004	229-02-00066	SCREW,2-56X5/16 PAN HD	1	EA	PRCMT OPTION	MS51957-4
005	273-02-00003	WASHER,#2, FLT ST STL	1	EA	PRCMT OPTION	MS15795-802
006	049-98-00010	CLIP,THERMAL EQUALIZING	3	EA	WAKEFIELD	259-18-25
007	189-98-00011	PAD,XSTR,TO-5 8PIN,.075H	2	EA	MILTON ROSS	10193-DAP
008	189-98-00004	PAD,XSTR 4 PIN*USE OPTL*	23	EA	DEL BLINN	100-000-NY
009	065-98-00012	CONT,PCB MOUNT RECEPTACLE	6	EA	AMP	85861-4
010	276-99-00008	WIRE,#22,BUSS,SOLID	1	FT	FWSI	619-22
011	268-02-00046	TUBING,#22,EXTR TEF,WHT	1	FT	QVL	MIL-I-22129
012	070-98-00004	CD,NYL LACE,B FNSH,TYPE 1	AR	RL	QVL/GUDEBROD	MIL-T-43435/#20
C 001	301-13-10002	CAP,CR , 50V .100 UF 20%	1	EA	ERIE/MML	8131-050-651-104M
C 002	304-20-20009	CAP. 200PF 1% 500V	1	EA	FWSI	600
C 003	301-13-10002	CAP,CR , 50V .100 UF 20%	1	EA	ERIE/MML	8131-050-651-104M
C 004	304-13-05109	CAP. 51PF 1% 500V	1	EA	FWSI	600
C 005	301-13-10002	CAP,CR , 50V .100 UF 20%	1	EA	ERIE/MML	8131-050-651-104M
C 006	337-11-39004	CAP., 39MF 10% 10V	1	EA	FWSI	601
C 007	999-01-01239	CAP,*FREQ/VAR*	AR	EA	FWSI	16247
C 008	304-01-00509	CAP. 5PF .5PF 500V	1	EA	FWSI	600
C 009	305-20-20000	CAP. 2000PF 1% 500V	1	EA	FWSI	600
C 010	301-13-10002	CAP,CR , 50V .100 UF 20%	1	EA	ERIE/MML	8131-050-651-104M
C 011	301-13-10002	CAP,CR , 50V .100 UF 20%	1	EA	ERIE/MML	8131-050-651-104M
C 012	301-13-10002	CAP,CR , 50V .100 UF 20%	1	EA	ERIE/MML	8131-050-651-104M
C 013	336-14-10003	CAP. 1.0MF 10% 35V	1	EA	FWSI	601
C 014	301-71-10001	CAP,CR,50V .01UF +80,-20%	1	EA	ERIE/MML	GP50-103ZC/TA-.01
C 015	999-01-01240	CAP,*FREQ/VAR*	AR	EA	FWSI	16247
C 016	337-14-68003	CAP. 6.8MF 10% 35V	1	EA	FWSI	601
C 017	304-08-03009	CAP. 30PF .5PF 500V	1	EA	FWSI	600
C 018	337-14-68003	CAP. 6.8MF 10% 35V	1	EA	FWSI	601
C 020	301-03-10001	CAP,CR , 50V .010 UF 20%	1	EA	ERIE/MML	8121-050-651-103M
CR001	088-10-41480	DIODE,SW,75V/5UA,4NS/10MA	1	EA	CODI/MML	1N4148
CR002	088-10-41480	DIODE,SW,75V/5UA,4NS/10MA	1	EA	CODI/MML	1N4148
CR003	088-99-00119	DIODE,ZENER,12.0V,1N759A	1	EA	FWSI	642-13
CR004	088-99-00329	DIODE,ZENER, 6.2V,1N753A	1	EA	FWSI	642-07
CR005	088-10-41480	DIODE,SW,75V/5UA,4NS/10MA	1	EA	CODI/MML	1N4148
CR006	088-10-41480	DIODE,SW,75V/5UA,4NS/10MA	1	EA	CODI/MML	1N4148
CR007	088-99-00379	DIODE,ZENER, 9.1V,1N757A	1	EA	FWSI	642-11
CR008	088-10-41480	DIODE,SW,75V/5UA,4NS/10MA	1	EA	CODI/MML	1N4148
CR009	088-10-41480	DIODE,SW,75V/5UA,4NS/10MA	1	EA	CODI/MML	1N4148
CR011	088-10-41480	DIODE,SW,75V/5UA,4NS/10MA	1	EA	CODI/MML	1N4148
CR012	088-10-41480	DIODE,SW,75V/5UA,4NS/10MA	1	EA	CODI/MML	1N4148
CR013	088-10-41480	DIODE,SW,75V/5UA,4NS/10MA	1	EA	CODI/MML	1N4148
CR014	088-10-41480	DIODE,SW,75V/5UA,4NS/10MA	1	EA	CODI/MML	1N4148
CR015	088-10-41480	DIODE,SW,75V/5UA,4NS/10MA	1	EA	CODI/MML	1N4148
CR016	088-10-41480	DIODE,SW,75V/5UA,4NS/10MA	1	EA	CODI/MML	1N4148
CR017	088-10-41480	DIODE,SW,75V/5UA,4NS/10MA	1	EA	CODI/MML	1N4148
CR018	088-10-41480	DIODE,SW,75V/5UA,4NS/10MA	1	EA	CODI/MML	1N4148
Q 001	263-10-22221	XSTR,NPN 75V,DC/UHF AMPL	1	EA	FCH/MML	2N2222A

(CONTINUED)

PARTS LIST: 15796 MFR. NAME: FWSI PARENT STK. CONT. NO.: 205-89-00406

DESCRIPTION: PWA,VCO UM: EA ECO NO.: 0401005 ENG. REV.: PB

4530-82

ITEM NO.	COMPONENT STK. CONT. NO.	DESCRIPTION	QUANTITY	UM	MFR. NAME	MFR. PART/ASSY. NO.
Q 002	263-10-22221	XSTR,NPN 75V,DC/UHF AMPL	1	EA	FCH/MML	2N2222A
Q 003	263-97-00093	XSTR,PNP,SWITCH/AMPL,50V	1	EA	FCH/MML	2N3251
Q 004	263-10-39470	XSTR,NPN 40V SW-AMPL,HFE	1	EA	FCH/MML	2N3947
Q 005	263-97-00093	XSTR,PNP,SWITCH/AMPL,50V	1	EA	FCH/MML	2N3251
Q 006	263-97-00093	XSTR,PNP,SWITCH/AMPL,50V	1	EA	FCH/MML	2N3251
Q 007	263-97-00093	XSTR,PNP,SWITCH/AMPL,50V	1	EA	FCH/MML	2N3251
Q 008	263-10-39470	XSTR,NPN 40V SW-AMPL,HFE	1	EA	FCH/MML	2N3947
Q 009	263-10-39470	XSTR,NPN 40V SW-AMPL,HFE	1	EA	FCH/MML	2N3947
Q 010	263-10-39470	XSTR,NPN 40V SW-AMPL,HFE	1	EA	FCH/MML	2N3947
Q 011	263-10-39470	XSTR,NPN 40V SW-AMPL,HFE	1	EA	FCH/MML	2N3947
Q 012	263-10-39470	XSTR,NPN 40V SW-AMPL,HFE	1	EA	FCH/MML	2N3947
Q 013	263-10-39470	XSTR,NPN 40V SW-AMPL,HFE	1	EA	FCH/MML	2N3947
Q 014	263-10-39470	XSTR,NPN 40V SW-AMPL,HFE	1	EA	FCH/MML	2N3947
Q 015	263-10-39470	XSTR,NPN 40V SW-AMPL,HFE	1	EA	FCH/MML	2N3947
Q 016	263-10-39470	XSTR,NPN 40V SW-AMPL,HFE	1	EA	FCH/MML	2N3947
Q 017	263-97-00093	XSTR,PNP,SWITCH/AMPL,50V	1	EA	FCH/MML	2N3251
Q 018	263-10-39470	XSTR,NPN 40V SW-AMPL,HFE	1	EA	FCH/MML	2N3947
Q 019	263-97-00093	XSTR,PNP,SWITCH/AMPL,50V	1	EA	FCH/MML	2N3251
Q 020	263-10-39470	XSTR,NPN 40V SW-AMPL,HFE	1	EA	FCH/MML	2N3947
Q 021	263-97-00093	XSTR,PNP,SWITCH/AMPL,50V	1	EA	FCH/MML	2N3251
Q 022	263-97-00093	XSTR,PNP,SWITCH/AMPL,50V	1	EA	FCH/MML	2N3251
Q 023	263-10-39470	XSTR,NPN 40V SW-AMPL,HFE	1	EA	FCH/MML	2N3947
Q 024	263-10-39470	XSTR,NPN 40V SW-AMPL,HFE	1	EA	FCH/MML	2N3947
R 001	608-09-12100	RES. 1.21K OHM 1% 1/10W	1	EA	EMR	624
R 002	608-09-11801	RES, 11.8K 1% 1/10W	1	EA	EMR	624
R 003	616-02-62009	RES,620 OHM 5% 1/4W	1	EA	ALLEN BRAD	RC07GF621J
R 004	201-98-00295	POT,TRMR,1.0 K 10% .75W	1	EA	BECK/MML	89PR1K
R 005	608-09-20009	RES, 200.0 OHM 1% 1/10W	1	EA	FWSI	624
R 006	608-09-12100	RES. 1.21K OHM 1% 1/10W	1	EA	EMR	624
R 007	608-09-66500	RES, 6.65K 1% 1/10W	1	EA	FWSI	624
R 008	201-98-00062	POT,TRMR,200 OHM 10% .5W	1	EA	BECK/MML	62PR200
R 009	608-09-34000	RES, 3.40K 1% 1/10W	1	EA	FWSI	624
R 010	608-09-51109	RES, 511.0 OHM 1% 1/10W	1	EA	FWSI	624
R 011	608-09-34000	RES, 3.40K 1% 1/10W	1	EA	FWSI	624
R 012	608-09-10001	RES. 10K 1% 1/10W	1	EA	FWSI	624
R 013	608-09-51101	RES, 51.1K 1% 1/10W	1	EA	FWSI	624
R 014	201-98-00152	POT.,10K CERMET,100PPM	1	EA	BECKMAN	78PR10K
R 015	608-09-90901	RES, 90.9K 1% 1/10W	1	EA	FWSI	624
R 016	608-09-10001	RES. 10K 1% 1/10W	1	EA	FWSI	624
R 017	608-09-10001	RES. 10K 1% 1/10W	1	EA	FWSI	624
R 018	608-09-10000	RES. 1K 1% 1/10W	1	EA	FWSI	624
R 019	616-02-51002	RES,510K 5% 1/4W	1	EA	ALLEN BRAD	RC07GF514J
R 020	616-02-51002	RES,510K 5% 1/4W	1	EA	ALLEN BRAD	RC07GF514J
R 021	616-02-27009	RES,270 OHM 5% 1/4W	1	EA	ALLEN BRAD	RC07GF271J
R 022	616-02-20009	RES,200 OHM 5% 1/4W	1	EA	ALLEN BRAD	RC07GF201J
R 023	616-02-33000	RES,3.3K 5% 1/4W	1	EA	ALLEN BRAD	RC07GF332J
R 024	999-01-01238	RES,*DEV/VAR*	AR	EA	FWSI	16247
R 025	608-09-20000	RES. 2.0K 1% 1/10W	1	EA	FWSI	624

(CONTINUED)

PARTS LIST: 15796 MFR. NAME: FWSI PARENT STK. CONT. NO.: 205-89-00406

DESCRIPTION: PWA,VCO UM: EA ECO NO.: 0401005 ENG. REV.: PB

4530-82

ITEM NO.	COMPONENT STK. CONT. NO.	DESCRIPTION	QUANTITY	UM	MFR. NAME	MFR. PART/ASSY. NO.
R 026	608-09-10001	RES. 10K 1% 1/10W	1	EA	FWSI	624
R 027	608-09-10001	RES. 10K 1% 1/10W	1	EA	FWSI	624
R 028	608-09-30100	RES. 3.01K 1% 1/10W	1	EA	FWSI	624
R 029	608-09-45300	RES, 4.53K 1% 1/10W	1	EA	FWSI	624
R 030	608-09-10001	RES. 10K 1% 1/10W	1	EA	FWSI	624
R 031	616-02-39009	RES,390 OHM 5% 1/4W	1	EA	ALLEN BRAD	RC07GF391J
R 032	616-02-82009	RES,820 OHM 5% 1/4W	1	EA	ALLEN BRAD	RC07GF821J
R 033	608-09-20001	RES. 20K 1% 1/10W	1	EA	FWSI	624
R 034	201-98-00159	POT.,100K CERMET,0/ -250	1	EA	BECKMAN	78PR100K
R 035	608-09-40200	RES, 4.02K 1% 1/10W	1	EA	FWSI	624
R 036	608-09-68100	RES. 6.81K 1% 1/10W	1	EA	FWSI	624
R 037	201-98-00296	POT,TRMR,2.0 K 10% .75W	1	EA	BECK/MML	89PR2K
R 038	608-09-28700	RES, 2.87K 1% 1/10W	1	EA	FWSI	624
R 039	608-09-30100	RES. 3.01K 1% 1/10W	1	EA	FWSI	624
R 040	608-09-88709	RES, 887.0 OHM 1% 1/10W	1	EA	FWSI	624
R 041	608-09-57609	RES, 576.0 OHM 1% 1/10W	1	EA	FWSI	624
R 042	616-02-13000	RES,1.3K 5% 1/4W	1	EA	ALLEN BRAD	RC07GF132J
R 043	616-02-56000	RES,5.6K 5% 1/4W	1	EA	ALLEN BRAD	RC07GF562J
R 044	616-02-10000	RES,1K 5% 1/4W	1	EA	ALLEN BRAD	RC07GF102J
R 045	608-09-20500	RES. 2.05K 1% 1/10W	1	EA	FWSI	624
R 046	608-09-20000	RES. 2.0K 1% 1/10W	1	EA	FWSI	624
R 047	616-02-30009	RES. 300 OHM 5% 1/4W	1	EA	ALLEN BRAD	RC07GF301J
R 048	616-02-51009	RES,510 OHM 5% 1/4W	1	EA	ALLEN BRAD	RC07GF511J
R 049	608-09-23700	RES., 2.37K 1% 1/10W	1	EA	FWSI	624
R 050	616-02-12000	RES,1.2K 5% 1/4W	1	EA	ALLEN BRAD	RC07GF122J
R 051	616-02-51009	RES,510 OHM 5% 1/4W	1	EA	ALLEN BRAD	RC07GF511J
R 052	608-09-10001	RES. 10K 1% 1/10W	1	EA	FWSI	624
R 053	608-09-15000	RES, 1.50K 1% 1/10W	1	EA	FWSI	624
R 054	616-02-01809	RES,18 OHM 5% 1/4W	1	EA	ALLEN BRAD	RC07GF180J
R 055	616-02-15000	RES,1.5K 5% 1/4W	1	EA	ALLEN BRAD	RC07GF152J
R 056	201-98-00296	POT,TRMR,2.0 K 10% .75W	1	EA	BECK/MML	89PR2K
R 057	608-09-30100	RES. 3.01K 1% 1/10W	1	EA	FWSI	624
R 058	616-02-01809	RES,18 OHM 5% 1/4W	1	EA	ALLEN BRAD	RC07GF180J
R 059	616-02-51000	RES,5.1K 5% 1/4W	1	EA	ALLEN BRAD	RC07GF512J
R 060	201-98-00062	POT,TRMR,200 OHM 10% .5W	1	EA	BECK/MML	62PR200
R 062	608-09-64909	RES, 649.0 OHM 1% 1/10W	1	EA	FWSI	624
R 063	601-22-30000	RES, 3K 3% 1W	1	EA	DALE/MML	RS-1A
R 064	616-02-75000	RES,7.5K 5% 1/4W	1	EA	ALLEN BRAD	RC07GF752J
R 065	608-09-15000	RES, 1.50K 1% 1/10W	1	EA	FWSI	624
R 066	616-02-75000	RES,7.5K 5% 1/4W	1	EA	ALLEN BRAD	RC07GF752J
R 067	608-09-49900	RES. 4.99K 1% 1/10W	1	EA	FWSI	624
R 068	608-09-90900	RES. 9.09K 1% 1/10W	1	EA	FWSI	624
R 069	608-01-02499	RES, 24.9 OHMS 1% 1/10W	1	EA	EMR	624
R 070	616-02-51009	RES,510 OHM 5% 1/4W	1	EA	ALLEN BRAD	RC07GF511J
R 071	201-98-00296	POT,TRMR,2.0 K 10% .75W	1	EA	BECK/MML	89PR2K
R 072	608-09-90909	RES, 909.0 OHM 1% 1/10W	1	EA	EMR	624
R 073	608-09-69809	RES, 698.0 OHM 1% 1/10W	1	EA	FWSI	624
R 074	201-98-00291	POT,TRMR, 50 OHM 20% .75W	1	EA	BECK/MML	89PR50

(CONTINUED)

PARTS LIST: 15796 MFR. NAME: FWSI PARENT STK. CONT. NO.: 205-89-00406

DESCRIPTION: PWA,VCO UM: EA ECO NO.: 0401005 ENG. REV.: PB

4530-82

ITEM NO.	COMPONENT STK. CONT. NO.	DESCRIPTION	QUANTITY	UM	MFR. NAME	MFR. PART/ASSY. NO.
R 075	616-02-30000	RES,3K 5% 1/4W	1	EA	ALLEN BRAD	RC07GF302J
R 076	608-09-49900	RES. 4.99K 1% 1/10W	1	EA	FWSI	624
R 077	608-09-15000	RES, 1.50K 1% 1/10W	1	EA	FWSI	624
R 078	608-09-90900	RES. 9.09K 1% 1/10W	1	EA	FWSI	624
R 079	608-01-02499	RES, 24.9 OHMS 1% 1/10W	1	EA	EMR	624
R 080	608-09-10000	RES. 1K 1% 1/10W	1	EA	FWSI	624
R 081	616-02-10000	RES,1K 5% 1/4W	1	EA	ALLEN BRAD	RC07GF102J
R 082	616-02-91000	RES,9.1K 5% 1/4W	1	EA	ALLEN BRAD	RC07GF912J
R 083	616-02-68009	RES,680 OHM 5% 1/4W	1	EA	ALLEN BRAD	RC07GF681J
R 084	201-98-00151	POT.,2K 10% CERMET,100PPM	1	EA	BECKMAN	78PR2K
R 085	616-02-04709	RES,47 OHM 5% 1/4W	1	EA	ALLEN BRAD	RC07GF470J
R 086	616-02-10000	RES,1K 5% 1/4W	1	EA	ALLEN BRAD	RC07GF102J
R 087	616-02-62000	RES,6.2K 5% 1/4W	1	EA	ALLEN BRAD	RC07GF622J
R 088	616-02-22009	RES,220 OHM 5% 1/4W	1	EA	ALLEN BRAD	RC07GF221J
R 089	616-02-01009	RES,10 OHM 5% 1/4W	1	EA	ALLEN BRAD	RC07GF100J
R 090	616-02-01009	RES,10 OHM 5% 1/4W	1	EA	ALLEN BRAD	RC07GF100J
R 091	616-02-18001	RES,18K 5% 1/4W	1	EA	ALLEN BRAD	RC07GF183J
R 092	616-02-22009	RES,220 OHM 5% 1/4W	1	EA	ALLEN BRAD	RC07GF221J
R 093	608-09-88700	RES, 8.87K 1% 1/10W	1	EA	FWSI	624
R 095	616-02-10009	RES,100 OHM 5% 1/4W	1	EA	ALLEN BRAD	RC07GF101J
R 096	608-09-51109	RES, 511.0 OHM 1% 1/10W	1	EA	FWSI	624
Z 001	046-97-00154	IC,LIN AMPL,OPNL DC-30MHZ	1	EA	FCH/MML	702HC
Z 002	046-97-00154	IC,LIN AMPL,OPNL DC-30MHZ	1	EA	FCH/MML	702HC
REF001	905-01-00374	SCHEMATIC	AR	EA	FWSI	15794
REF002	905-04-00002	SPEC,COMPONENT SPACING	AR	EA	FWSI	9500-1
REF003	905-07-00159	SPEC,ENG,AGED	AR	EA	FWSI	11243

(END OF LIST)

Table 6-2. Recommended Spares List

PART DESCRIPTION	EMR STOCK NO.	VENDOR NAME	VENDOR PART NO.	TQ	RS
MODEL 4530-X1					
INTEGRATED CIRCUIT, MA702C	046-18-00006	FCH	U5B770239X	4	1
DIODE	088-10-41480	JEDEC	1N4148	32	4
POTENTIOMETER, 2K ±10%, 1W	201-98-00089	Amphenol	2600P-202-BS1066	6	1
TRANSISTOR	263-10-39470	JEDEC	2N3947	38	4
TRANSISTOR	263-99-00139	Spec	805-1	22	3
CAPACITOR, 0.1 µf +80% −20%, 50V	301-14-10002	Erie	8131-050-651-104Z	12	2
CAPACITOR, 1.0 µf ±20%, 35V	336-23-10003	Spec	601	6	1
CAPACITOR, 6.8 µf ±20%, 35V	337-23-68003	Spec	601	6	1
RESISTOR, 1.50K ±1%, 1/10W	608-09-15000	Spec	624	6	1
RESISTOR, 3.01K ±1%, 1/10W	608-09-30100	Spec	624	6	1
RESISTOR, 9.09K ±1%, 1/10W	608-09-90900	Spec	624	8	1
RESISTOR, 10K ±1%, 1/10W	608-09-10001	Spec	624	14	2
RESISTOR, 510 Ω ±5%, 1/4W	616-02-51009	Allen Bradley	RC07GF511J	6	1
RESISTOR, 1K ±5%, 1/4W	616-02-10000	Allen Bradley	RC07GF102J	8	1
RESISTOR, 1.5K ±5%, 1/4W	616-02-15000	Allen Bradley	RC07GF152J	6	1
RESISTOR, 9.1K ±5%, 1/4W	616-02-91000	Allen Bradley	RC07GF912J	6	1
RESISTOR, 10K ±5%, 1/4W	616-02-10001	Allen Bradley	RC07GF103J	8	1
MODEL 4530-X2					
INTEGRATED CIRCUIT, MA702C	046-18-00006	FCH	U5B770239X	4	1
DIODE	088-10-41480	JEDEC	1N4148	33	4
POTENTIOMETER, 2K ±10%, 1W	201-98-00089	Amphenol	2600P-202-BS1066	6	1
TRANSISTOR	263-10-39470	JEDEC	2N3947	38	4
TRANSISTOR	263-99-00139	Spec	805-1	22	3
CAPACITOR, 0.1 µf +80% −20%, 50V	301-14-10002	Erie	8131-050-651-104Z	12	2
CAPACITOR, 1.0 µf ±20%, 35V	336-23-10003	Spec	601	6	1

Table 6-2 (Cont'd.). Recommended Spares List

PART DESCRIPTION	EMR STOCK NO.	VENDOR NAME	VENDOR PART NO.	TQ	RS
CAPACITOR, 6.8 μf ±20%, 35V	337-23-68003	Spec	601	6	1
RESISTOR, 1.50K ±1%, 1/10W	608-09-15000	Spec	624	6	1
RESISTOR, 3.01K ±1%, 1/10W	608-09-30100	Spec	624	6	1
RESISTOR, 9.09K ±1%, 1/10W	608-09-90900	Spec	624	8	1
RESISTOR, 10K ±1%, 1/10W	608-09-10001	Spec	624	14	2
RESISTOR, 510 Ω ±5%, 1/4W	616-02-51009	Allen Bradley	RC07GF511J	6	1
RESISTOR, 1K ±5%, 1/4W	616-02-10000	Allen Bradley	RC07GF102J	8	1
RESISTOR, 1.5K ±5%, 1/4W	616-02-15000	Allen Bradley	RC07GF152J	6	1
RESISTOR, 9.1K ±5%, 1/4W	616-02-91000	Allen Bradley	RC07GF912J	6	1
RESISTOR, 10K ±5%, 1/4W	616-02-10001	Allen Bradley	RC07GF103J	8	1
MODEL 4530-X3					
INTEGRATED CIRCUIT, MA702C	046-18-00006	FCH	U5B770239X	4	1
DIODE	088-10-41480	JEDEC	1N4148	34	4
POTENTIOMETER, 1K ±10%, 1W	201-98-00015	Amp. Borg	2600P-102-BS1066	6	1
TRANSISTOR	263-10-39470	JEDEC	2N3947	38	4
TRANSISTOR	263-99-00139	Spec	805-1	22	3
CAPACITOR, 0.1 μf +80% −20%, 50V	301-14-10002	Erie	8131-050-651-104Z	12	2
CAPACITOR, 1.0 μf ±20%, 35V	336-23-10003	Spec	601	6	1
CAPACITOR, 6.8 μf ±20%, 35V	337-23-68003	Spec	601	6	1
RESISTOR, 1.50K ±1%, 1/10W	608-09-15000	Spec	624	6	1
RESISTOR, 3.01K ±1%, 1/10W	608-09-30100	Spec	624	6	1
RESISTOR, 9.09K ±1%, 1/10W	608-09-90900	Spec	624	8	1
RESISTOR, 10K ±1%, 1/10W	608-09-10001	Spec	624	14	2
RESISTOR, 510 Ω ±5%, 1/4W	616-02-51009	Allen Bradley	RC07GF511J	6	1
RESISTOR, 1K ±5%, 1/4W	616-02-10000	Allen Bradley	RC07GF102J	8	1
RESISTOR, 1.5K ±5%, 1/4W	616-02-15000	Allen Bradley	RC07GF152J	6	1
RESISTOR, 9.1K ±5%, 1/4W	616-02-91000	Allen Bradley	RC07GF912J	6	1
RESISTOR, 10K ±5%, 1/4W	616-02-10001	Allen Bradley	RC07GF103J	8	1

Table 6-2 (Cont'd.). Recommended Spares List

PART DESCRIPTION	EMR STOCK NO.	VENDOR NAME	VENDOR PART NO.	TQ	RS
MODEL 4530-X4					
INTEGRATED CIRCUIT, MA702C	046-18-00006	FCH	U5B770239X	4	1
DIODE	088-10-41480	JEDEC	1N4148	34	4
POTENTIOMETER, 1K ±10%, 1W	201-98-00015	Amp. Borg	2600P-102-BS1066	6	1
TRANSISTOR	263-10-39470	JEDEC	2N3947	38	4
TRANSISTOR	263-99-00139	Spec	805-1	22	3
CAPACITOR, 0.1 µf +80% -20%, 50V	301-14-10002	Erie	8131-050-651-104Z	12	2
CAPACITOR, 1.0 µf ±20%, 35V	336-23-10003	Spec	601	6	1
CAPACITOR, 6.8 µf ±20%, 35V	337-23-68003	Spec	601	6	1
RESISTOR, 1.50K ±1%, 1/10W	608-09-15000	Spec	624	6	1
RESISTOR, 3.01K ±1%, 1/10W	608-09-30100	Spec	624	6	1
RESISTOR, 9.09K ±1%, 1/10W	608-09-90900	Spec	624	8	1
RESISTOR, 10K ±1%, 1/10W	608-09-10001	Spec	624	14	2
RESISTOR, 510 Ω ±5%, 1/4W	616-02-51009	Allen Bradley	RC07GF511J	6	1
RESISTOR, 1K ±5%, 1/4W	616-02-10000	Allen Bradley	RC07GF102J	8	1
RESISTOR, 1.5K ±5%, 1/4W	616-02-15000	Allen Bradley	RC07GF152J	6	1
RESISTOR, 9.1K ±5%, 1/4W	616-02-91000	Allen Bradley	RC07GF912J	6	1
RESISTOR, 10K ±5%, 1/4W	616-02-10001	Allen Bradley	RC07GF103J	8	1

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